

TITLE
Drum Ventilation System (DVS) Design – Structure

AUTHOR
Stacey Nicholes

EWR NO.
379603

DISCIPLINE: Mechanical

ECP NO. EN-4554-00

REV	CHECKER	DATE	REV	CHECKER	DATE	REV	CHECKER	DATE

BACKGROUND, OBJECTIVE, REQUIREMENT

From inception of operations at TOCDF, the secondary wastes were planned to be treated at TOCDF exclusively. This is a requirement of the TOCDF RCRA permit. As operational experience has matured, it has been recognized that treatment of all the wastes at TOCDF may not be practical. Based on the amount and type of wastes generated during the different campaigns, other treatment methods and/or offsite shipment options are being developed.

Part of the Secondary Waste Campaign strategy is to ship secondary waste (SW) offsite if headspace monitoring results are below 1 VSL. Testing to validate that headspace concentrations below 1 VSL are sufficient to characterize the waste as below the Waste Control Limit (WCL) is in progress and a permit modification request (TOCDF-WAP-02-0989) to allow characterization of waste DPE suits which were monitored after use at less than 1 VSL during the airlock exit process to be characterized by headspace monitoring is being reviewed by the DSHW. Additional permit modification requests would be submitted for other waste categories as appropriate. In order to accomplish headspace monitoring for SW characterization in a safe and cost effective manner, the Drum Ventilation System (DVS) and the Drum Ventilation System Sort Room (DVSSR) will be designed and installed inside Igloo-1632 at Area-10. Testing is also in progress to validate the concept that the agent concentration in the drum headspace is representative of the concentration in the headspace above the waste contained in bags inside the drum. If this concept is validated, then the DVS could be used to monitor the drum headspace without opening the drum, and if less than 1 VSL, the drum could become a candidate for offsite disposal without any further handling. If this concept is not validated, the DVS could still be used to monitor the drum headspace to guide subsequent processing prior to opening the drum for waste handling in the DVSSR.

It is proposed to install a Drum Ventilation System (DVS) to safely perform headspace monitoring of Secondary Waste Containers (SWCs) for the purpose of classifying SWCs by agent contamination potential. The DVS will be designed to be a ventilated enclosure with glove ports for operators to manipulate tools and agent monitoring sample lines to safely monitor the headspace of SWCs. A passive conveyor system allows easy transfer of containment trays holding up to six 55-gallon drums.

A team was established in the early stages of the design to determine design criteria for the DVS. The following is the list of requirements that was developed.

1. DVS Operations

- a. Operations Allowed:
 1. Punch a hole in the drum
 2. Stick ACAMS wand inside
- b. Operations NOT Allowed:
 1. Not designed to punch hole in the bag
 2. No entries allowed with drums inside DVS.
- c. Operations will attempt to process waste according to type, i.e. DPE suits...

2. DVS Enclosure

- a. The DVS is to be designed to allow the following containers to be placed inside of the enclosure at one time:
 1. 6 - drums
 2. 3 - overpacked drums
 3. 1 - 4'x4' Container (CAMDS Waste)
- b. The DVS will be constructed from carbon steel and all exposed surfaces are to be painted with epoloid.
- c. Lighting is to be installed on the outside of the DVS, isolated by glass, and shall meet or exceed the minimum foot candles per specification. Switches will be provided on each DVS.
- d. Glove ports are to be designed to:
 1. 46" to 48" from ground to centerline of gloveports
 2. Area 10 glove ring design will be used
 3. Gloves WILL NOT be designed to reach the bottom of the containers
 4. Roof will be designed to hold up to 250 pounds suspended from the ceiling on a monorail system that will be designed to fit inside of the DVS to allow for tools and materials to be lifted and transferred between containers on the same side.
- e. The DVS door will be designed with the following considerations:
 1. The door will open by sliding to the side
 2. The door will closed tight by clamping shut

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- 3. The door will have the following indications
 - Clamped
 - HVAC normal
- f. DVS's WILL NOT be electrically designed to be explosion proof
- g. Grounding will be provided on all windows, gloveports and the enclosure.
- h. The DVS needs to have the ability to keep tools inside to remove lids. In addition, the DVS needs to allow for extra lids so damaged lids can be replaced.

3. Conveyor Design

- a. Non motorized, free roller design
- b. The outside conveyor will be designed to be movable, free standing, allows fork lift to move the conveyor for access to other side
- c. Drums weight is assumed to be 600 lbs each. Maximum number of drums allowed in tray is 6.

4. HVAC

- a. DVS differential pressure:
 - 1. Minimum @ -0.25 inwc
 - 2. Operating Range @ between -0.50 inwc and -1.00 inwc
- b. The DVS will be tested to -2.00 inwc design pressure will be -3.00 inwc (-2.00 inwc x 1.5 safety factor)
- c. The door to the DVS will require that the HVAC be equalized to the room before it can be opened. This may be done by isolation the HVAC.
- d. Will use existing ventilation ducting were possible

5. Utilities

- a. DVS: The following utility drops will be included in each DVS
 - 1. Compressed air
 - 2. Process water
 - 3. Decon
- b. The DVS's will be supplied with bulkhead fittings for the 3 utilities w/ extra fittings for spares.

6. Containment

- a. Primary Containment: Container i.e. 55 gallon drum
- b. Secondary Containment: Transfer tray located on conveyor and the DVS
 - 1. The trays WILL NOT be used to transfer barrels to and from the input conveyors. The barrels will be moved independently.
 - 2. Trays will be designed to contain the contents of either 10% of total waste or one 55 gallon drum.
 - 3. Trays will be constructed from Carbon Steel and painted with epoloid.

7. SDS

- a. The DVS will be designed to allow any SDS that breached the primary containment to be drained and pumped to the SDS holding tank
- b. The drain system will use lined pipe

8. Drum Sampling

- a. Method TBD
- b. Exit criteria for waste TBD

9. ACAMS

- a. Monitoring for GB and VX agents at the same time

1. DESIGN INPUTS, SPECIFICATIONS, REFERENCES:

Specifications:

09900 – Painting General

References:

Roark's Formulas for Stress and Strain 7TH edition
Parker O-Ring Handbook – ORD 5700

FILE:C:\0stacey\0Current_design\379603 (DVS
Enclosure)\documentation\379603 Design Analysis Report.doc

SHEET 2 of 4

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2. DESIGN INTERFACES:

Cory Mecham – Secondary Waste Project Specialist, provided input on the requirements for the DVS.

Troy Worthen – Secondary Waste Processing Manager, provided input on the requirements for the DVS.

Steve Lane – Area 10 System Engineer, provided input on the requirements for the DVS as well as the utilities design for the DVS.

Dan Dekock – HVAC System Engineer, developed HVAC design

3. DESIGN ANALYSIS/LOGIC:

Calculation 1 – Bending Analysis of Window

Internal pressure within the DVS enclosure is a positive to atmospheric pressure and stresses the enclosure components. In particular, the enclosure gloveport/window is considered in this calculation as a component likely to fail. The window will be modeled using formula 8a in table 11.4 of Roark's Formulas for Stress and Strain 7TH edition as shown in calculation 1. Because the window is clamped to the exterior of the enclosure shell continuously on all edges, it is assumed that all edges are considered fixed. A pressure of 3 inwc is applied to the inside of the enclosure and is assumed to be uniform over the surface of the window. The window is oriented vertically thus gravity is ignored. This window is the largest of all the window pieces on the enclosure and will be used as the worst case scenario.

Calculation 2 – Door Seal

The combination of internal pressure within the enclosure, clamp force, seal compression needs to be considered to ensure proper sealing. In particular, the pneumatic clamps must exert enough force to overcome the internal pressure and seal compression. The door is clamped to the side of the enclosure using 10 DE-STA-CO model 802-U clamps on the top, bottom and sides each exerting a force of 200 lbs. The door is bounded horizontally by the clamp arms and the enclosure itself. A pressure of 3 inwc is applied to the inside of the enclosure and is assumed to be uniform over the inside face of the door. The gasket must be compressed to seal the door therefore exerts a force on the lid.

Calculation 3 – Enclosure frame

The enclosure frame was analyzed using a FEA modular called Algor. The frame was modeled with the end corners and middles pinned and the load of 250 lbs pointed loaded for the overhead trolley as well as the load for the drums of 6000 lbs was distributed on the members that will support the conveyors. The internal pressure was calculated for each wall and was distributed about the structural member.

4. DESIGN CALCULATIONS:

See attached Mathcad and Algor calculations.

5. DESIGN DRAWINGS:

Drawing Number	Rev	Description
EG-22-M-8230, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – General Assembly
EG-22-M-8231, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Drain Pan Assembly
EG-22-M-8231, sheet 2	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Drain pan Assembly
EG-22-M-8232, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Skin Assembly
EG-22-M-8232, sheet 2	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Skin Assembly
EG-22-M-8233, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Enclosure Assembly
EG-22-M-8234, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Frame Assembly
EG-22-M-8234, sheet 2	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Frame Assembly
EG-22-M-8235, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Airlock Assembly
EG-22-M-8235, sheet 2	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Airlock Assembly
EG-22-M-8235, sheet 3	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Airlock Assembly
EG-22-M-8236, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Main Glove Port/Window Assembly
EG-22-M-8236, sheet 2	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Main Glove Port/Window Assembly
EG-22-M-8237, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Drain Glove Port/Window Assembly
EG-22-M-8238, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Light/Window Assembly

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EG-22-M-8238, sheet 2	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Light/Window Assembly
EG-22-M-8239, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Door Assembly
EG-22-M-8240, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Door Trolley Assembly
EG-22-M-8241, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) DVS – Lifting Trolley Assembly
EG-22-D-8204, sheet 1	5A	Off Site Area 10 – 1632 P&ID Sheet #3
EG-22-G-8219, sheet 1	0A	Off Site Area 10 – Secondary Waste Sampling (SWS) Igloo 1632 General Arrangement Plan

6. OTHER

Conclusions:

Calculation 1 – Bending Analysis of Window

The calculation shows that the maximum stress that occurs in the window is 209.103 psi which compares to the material properties of Makrolon GP which is 9500 psi ultimate tensile strength. Therefore the window is adequate and will not fail under the designed pressures.

Calculation 2 – Door Seal

The calculations shows that with worst case conditions that the clamps would need to have a required exerting force of 75.4 lbs. Each clamp is rated as having a exerting force of 200 lbs.

Calculation 3 - Enclosure frame

The enclosure frame was analyzed and was found to be acceptable.

Calculation 1

Bending Analysis of Window

Assumptions:

The edges of the window is clamped uniformly and all edges are considered fixed. Loading on the window is 3 inwc uniform over the surface of the window.

Pressure Conversion:

Pressure is given in inches of water column and must be converted to pounds per square inch to be used in the following formulas.

Given: 3 inwc

Conversion: 1 inwc = .074 in_Hg

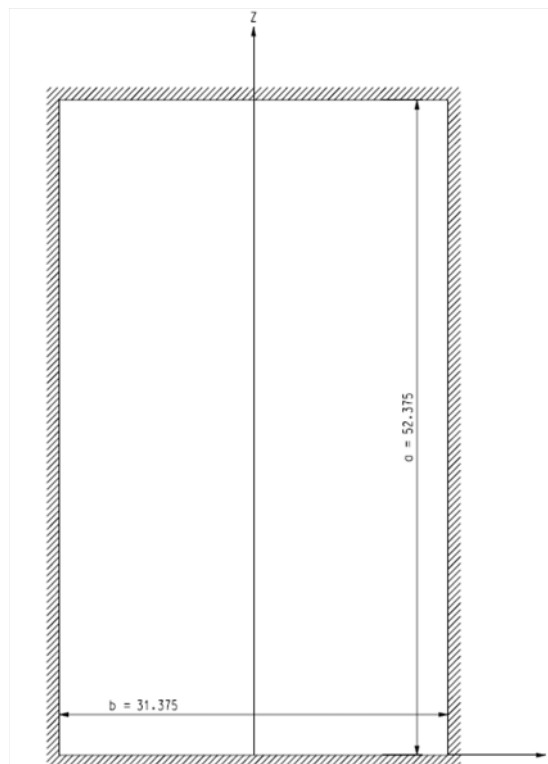
Conversion: 1 in_Hg = 0.491 psi

$$3 \cdot \frac{.074}{1} \cdot \frac{.491}{1} = 0.109$$

Therefore 3 inwc is equal to 0.109 psi.

Window Calculations

The loading on the window was modeled after formula 8a of Table 11.4 in Roark's Formulas for Stress and Strain as shown in the below figure. The table gives two formulas for the stress at the two most significant points on the model. These are the center of the long edge and at the center.



Calculation 1
Bending Analysis of Window

$$a := 52.375 \cdot \text{in}$$

$$b := 31.375 \cdot \text{in}$$

$$t := .5 \cdot \text{in}$$

$$\frac{a}{b} = 1.669$$

$$q := 0.109 \cdot \text{psi} \quad \text{Calculated above}$$

Per this information the following constants can be obtained from 8a in Table 11.4 using 1.8.

$$\beta_1 := 0.4872$$

$$\beta_2 := 0.2406$$

$$\alpha := 0.0267$$

Stress at center of long edges:

$$\sigma_{\max} := \frac{-\beta_1 \cdot q \cdot b^2}{t^2}$$

$$\sigma_{\max} = -209.103 \text{ psi}$$

Stress at center

$$\sigma_c := \frac{\beta_2 \cdot q \cdot b^2}{t^2}$$

$$\sigma_c = 103.264 \text{ psi}$$

Deflection under load

The deflection under the load and constants specified above is given as follows:

Where E is the modulus of elasticity and given as 345,000 psi for Makrolon GP

$$E := 345000 \cdot \text{psi}$$

$$Y_{\max} := \frac{\alpha \cdot q \cdot b^4}{E \cdot t^3}$$

$$Y_{\max} = 0.065 \text{ in}$$

Calculation 1
Bending Analysis of Window

Description

MAKROLON® GP polycarbonate sheet is a polished surface, UV stabilized polycarbonate for use in glazing and industrial applications. Offering economy and high performance, MAKROLON GP polycarbonate sheet meets or exceeds the physical properties of any product in its class. MAKROLON GP polycarbonate sheet is backed by a five year warranty against breakage.

Applications:

MAKROLON GP polycarbonate sheet is used extensively in school and factory glazing for protection against both accidental breakage and deliberate vandalism. In manufacturing environments, this high impact material excels in applications like machine guards, noise abatement shields, clear work station partitions, freight doors, and other in-plant glazing.

MAKROLON® GP

Typical Physical Properties

Property	Test Method	Units	MAKROLON
PHYSICAL			
Specific Gravity	ASTM D792	-	1.2
Refractive Index @ 72°F	ASTM D542	-	1.586
Light Transmission, Clear 1/8"	ASTM D1003	%	86
Light Transmission, Gray/Bronze	ASTM D1003	%	50
Light Transmission, Dark Gray	ASTM D1003	%	18
Rockwell Hardness	ASTM D785	-	M70/R118
Water Absorption, Equilibrium, 24 hrs	ASTM D570	%	0.15
MECHANICAL			
Tensile Strength, Yield	ASTM D638	psi	9000
Tensile Strength, Ultimate	ASTM D638	psi	9500
Tensile Modulus	ASTM D638	psi	345000
Flexural Strength	ASTM D790	psi	13500
Flexural Modulus	ASTM D790	psi	345000
Compressive Strength	ASTM D695	psi	12500
Compressive Modulus	ASTM D695	psi	345000
Elongation	ASTM D638	%	110
Poisson's Ratio	-	-	0.38
Izod Impact Strength, Notched @ 1/8"	ASTM D256	Ft-lbs/in	12-16
Izod Impact Strength, Unnotched @ 1/8"	ASTM D256	Ft-lbs/in	60 (No failure)
Instrumented Impact, 1/8"	ASTM D3763	Ft-lbs	>45
Shear Strength, @ Yield	ASTM D732	psi	6000
Shear Strength, Ultimate	ASTM D732	psi	10000
Shear Modulus	ASTM D732	psi	114000
THERMAL			
Coefficient of Thermal Expansion	ASTM D696	In/in/F	3.75 x 10 ⁻⁵
Coefficient of Thermal Conductivity	ASTM C177	Btu-in/hr-ft ² -F	1.35
Heat Deflection Temperature, @ 264 psi	ASTM D648	F	270
Heat Deflection Temperature, @ 66 psi	ASTM D648	F	280
Brittle Temperature	ASTM D746	F	-200
Shading Coefficient, Clear 1/8"	ASHRAE	-	1.02
Shading Coefficient Gray, Bronze 1/8"	ASHRAE	-	0.7
U Value 1/4" (summer gain, winter loss)	-	-	0.90, 0.96

Sheffield Plastics Inc. will not be responsible for the use of this information relative to actual application. Users must make their own determination of its suitability for their specific application. No warranty is made for the fitness of any product, and nothing herein waives any of the seller's conditions of sale.

Product Data

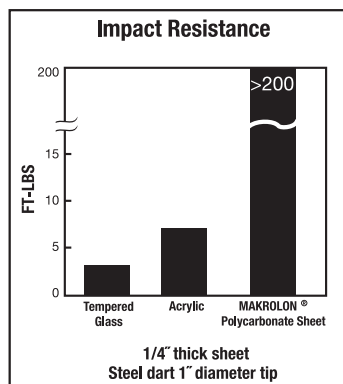
MAKROLON® GP

CODE COMPLIANCE

MAKROLON polycarbonate sheet products satisfy major building code requirements for a CC-1 rating in construction applications (BOCA, ICBO, SBCCI, and Dade County). MAKROLON polycarbonate sheet products are listed with Underwriters Laboratories for the UL flammability standard and the UL972 standard for burglary resistant glazing materials. Additionally, MAKROLON polycarbonate sheet is approved for Consumer Product Safety Commission (CPSC 16CFR 1201) categories I & II and ANSI Z97. 1-1984 Safety Glazing Standards.

Typical Physical Properties *(continued)*

Property	Test Method	Units	MAKROLON
ELECTRICAL			
Dielectric Constant, @ 10 Hz	ASTM D150	-	2.96
Dielectric Constant, @ 60 Hz	ASTM D150	-	3.17
Volume Resistivity	ASTM D257	Ohm-cm	8.2×10^{16}
Dissipation Factor, @ 60 Hz	ASTM D150	-	0.0009
Dissipation Factor, @ 1 MHz	ASTM D150	-	0.01
Arc Resistance	ASTM D495	Seconds	
Stainless Steel Strip Electrode			10-11
Tungsten Electrodes			120
Dielectric Strength, in air, 125 mils	ASTM D149	V/mil	380
FLAMMABILITY			
Horizontal Burn, AEB	ASTM D635	Inches	<1
Ignition Temperature, Self	ASTM D1929	F	1070
Ignition Temperature, Flash	ASTM D1929	F	870
UL 94, Clear @ .060"	UL 94	-	V2
UL 94, Clear @ .220"	UL 94	-	V0



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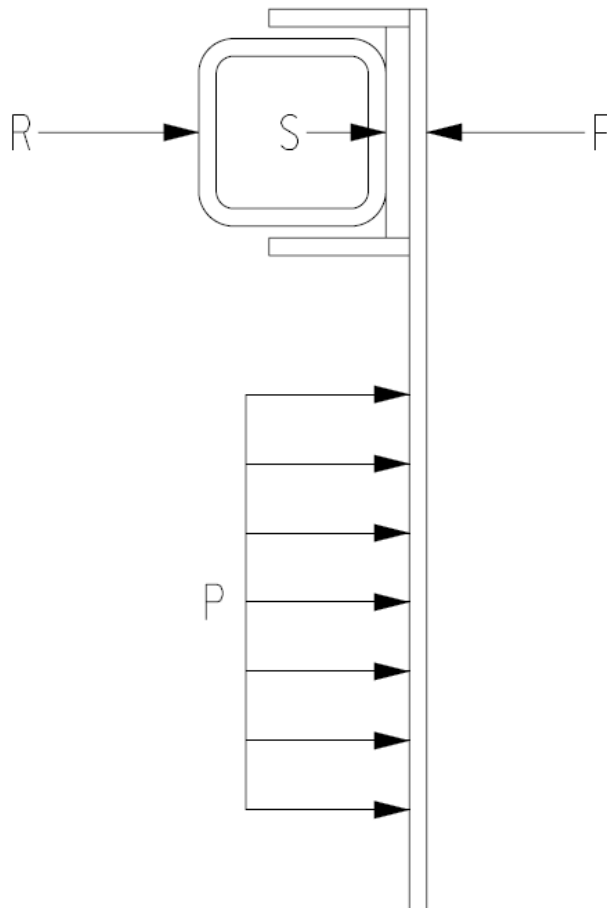


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Calculation 2 Door Seal

The below figure depicts the loading on a section of the door:



Where

F=Force of the clamps

P=Pressure from inside of the enclosure

R=Reaction force from the enclosure

S=Compression force from the spring of the gasket

Pressure Conversion:

Pressure is given in inches of water column and must be converted to pounds per square inch to be used in the following formulas.

Given: 3 inwc

Conversion: 1 inwc = .074 in_Hg

Conversion: 1 in_Hg = 0.491 psi

$$3 \cdot \frac{.074}{1} \cdot \frac{.491}{1} = 0.109$$

Therefore 3 inwc is equal to 0.109 psi.

Calculation 2 Door Seal

Pressure from inside of enclosure

The interior surface of the door that will have the pressure against it is 47.38" high X 57.38" wide or an area of 2719 sq in

$$P := 0.109 \cdot \text{psi} \cdot 2719 \cdot \text{in}^2$$

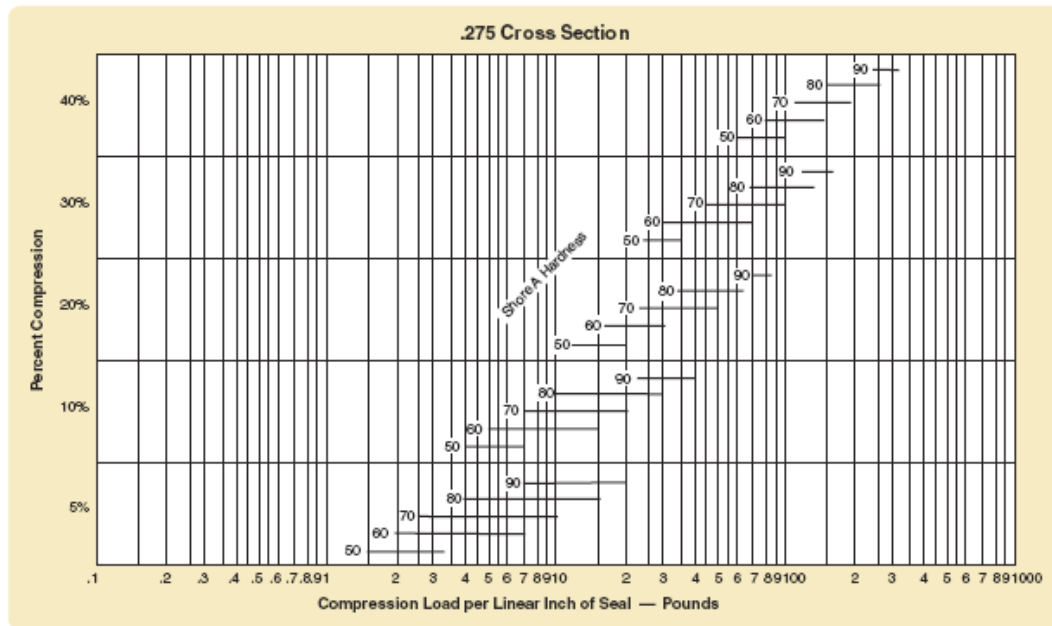
$$P = 296.371 \text{ lbf}$$

Seal Compression

Using the O-ring book from Parker expresses the compression force exerted by the seal as a function of the cross-sectional area of the seal, the durometer of the material, the compression as a percentage of the cross-sectional area, and the length of the seal. This is given in the form of chart.

The clamps come standard with a spindle. This spindle cap diameter of 0.63"

Parkers chart only go up to a cross sectional area of 0.275. This will be used as a worse case scenerio. The chart also only list 50 durometer and above. This will be used for a worst case scenerio. Bellow is the chart from Parker.



The chart shows a compression force of 2 lbs/in at a total compression of 20% of the area. The perimeter of the seal is 229 in. The total compression force is given by:

$$S := 2 \cdot \frac{\text{lb}}{\text{in}} \cdot 229 \cdot \text{in}$$

$$S = 458 \text{ lb}$$

Calculation 2
Door Seal

Reaction Force from Enclosure

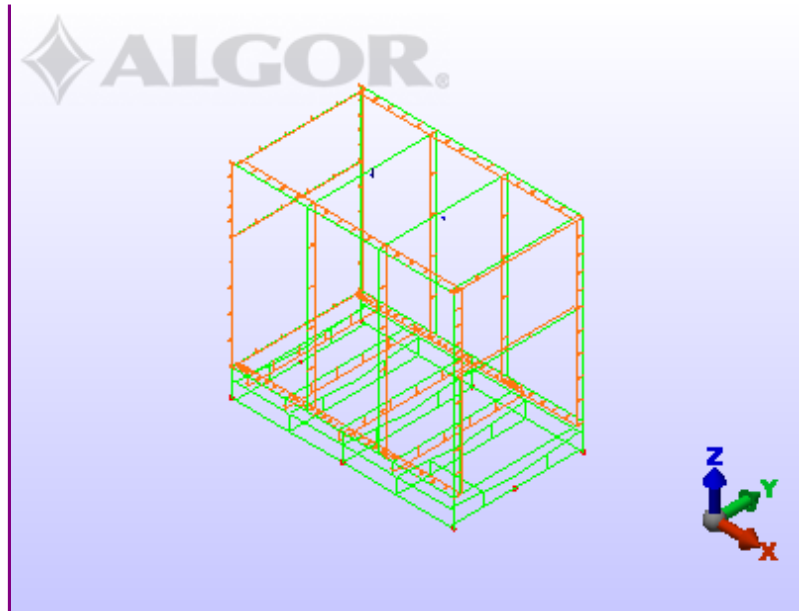
Considering the door and seal as on the reaction forces would be S+P

$$296.371 + 458 = 754.371$$

Given that there are 10 clamps the required force per clamp is 75.4 lbs. Each clamp as a exerting force of 200 lbs



Design Analysis



Last updated on 8/7/2008.

Project reviewed on 8/7/2008.

Summary

Model Information

Analysis Type - Static Stress with Linear Material Models

Units - English (in) - (lbf, in, s, deg F, deg F, V, ohm, A, in*lbf)

Model location - C:\0stacey\0Current_design\379603 (DVS Enclosure)\DVS ALGOR\DVS FINAL1.fem

Design scenario description - Design Scenario # i

Analysis Parameters Information

Load Case Multipliers

Static Stress with Linear Material Models may have multiple load cases. This allows a model to be analyzed with multiple loads while solving the equations a single time. The following is a list of load case multipliers that were analyzed with this model.

Load Case	Pressure/Surface Forces	Acceleration/Gravity	Displaced Boundary	Thermal	Voltage
1	1	0	0	0	0

Multiphysics Information

Default Nodal Temperature	0 °F
Source of Nodal Temperature	None
Time step from Heat Transfer Analysis	Last

Processor Information

Type of Solver	Automatic
Disable Calculation and Output of Strains	No
Calculate Reaction Forces	Yes
Invoke Banded Solver	Yes
Avoid Bandwidth Minimization	No
Stop After Stiffness Calculations	No
Displacement Data in Output File	No
Stress Data in Output File	No
Equation Numbers Data in Output File	No
Element Input Data in Output File	No
Nodal Input Data in Output File	No
Centrifugal Load Data in Output File	No

Part Information

Part ID	Part Name	Element Type	Material Name
1	Part 1	Beam	Steel (ASTM - A36)

Element Properties used for:

Part 1

Element Type	Beam
Stress Free Reference Temperature	0 °F
Layer 1 - Area	1.51
Layer 1 - SA2	0
Layer 1 - SA3	0
Layer 1 - J1	1.31
Layer 1 - I2	0.747
Layer 1 - I3	0.747
Layer 1 - S2	0.747
Layer 1 - S3	0.747

Material Information

Steel (ASTM - A36) -Beam

Material Model	Standard
Material Source	ALGOR Material Library
Material Source File	C:\Program Files\ALGOR\20.04\matlibs\algor.mat.mlb
Date Last Updated	2004/09/30 -16:00:00

Material Description	Structural Steel
Mass Density	7.35e -4 lbf*s^2/in/in^3
Modulus of Elasticity	29e6 lbf/in^2
Poisson's Ratio	0.29
Thermal Coefficient of Expansion	6.5e -6 1/°F

Load and Constraint Information

Loads

FEA Object Group 3: Nodal Forces

Nodal Force

ID	Description	Vertex ID	Node Number	Vx	Vy	Vz	Magnitude	Multiplier Table ID
2	Unnamed	229	91	0.000000	0.000000	1.000000	-125.000000	1
1	Unnamed	226	90	0.000000	0.000000	1.000000	-125.000000	1

FEA Object Group 4: Beam Distributed Loads

Beam Distributed Load

ID	Description	Line ID	Magnitude-I	Vx-I	Vy-I	Vz-I	Magnitude-J	Vx-J	Vy-J	Vz
3	Unnamed	126	-23.000000	0.000000	0.000000	1.000000	-23.000000	0.000000	0.000000	1.000000
4	Unnamed	127	-23.000000	0.000000	0.000000	1.000000	-23.000000	0.000000	0.000000	1.000000

FEA Object Group 5: Beam Distributed Loads

Beam Distributed Load

ID	Description	Line ID	Magnitude-I	Vx-I	Vy-I	Vz-I	Magnitude-J	Vx-J	Vy-J	Vz
6	Unnamed	139	-23.000000	0.000000	0.000000	1.000000	-23.000000	0.000000	0.000000	1.000000
5	Unnamed	140	-23.000000	0.000000	0.000000	1.000000	-23.000000	0.000000	0.000000	1.000000

FEA Object Group 6: Beam Distributed Loads

Beam Distributed Load

ID	Description	Line ID	Magnitude-I	Vx-I	Vy-I	Vz-I	Magnitude-J	Vx-J	Vy-J	Vz
13	Unnamed	19	1.800000	1.000000	0.000000	0.000000	1.800000	1.000000	0.000000	0.000000
12	Unnamed	18	1.800000	1.000000	0.000000	0.000000	1.800000	1.000000	0.000000	0.000000
7	Unnamed	20	1.800000	1.000000	0.000000	0.000000	1.800000	1.000000	0.000000	0.000000
8	Unnamed	4	1.800000	1.000000	0.000000	0.000000	1.800000	1.000000	0.000000	0.000000
11	Unnamed	6	1.800000	1.000000	0.000000	0.000000	1.800000	1.000000	0.000000	0.000000
9	Unnamed	5	1.800000	1.000000	0.000000	0.000000	1.800000	1.000000	0.000000	0.000000

FEA Object Group 7: Beam Distributed Loads

Beam Distributed Load

ID	Description	Line ID	Magnitude-I	Vx-I	Vy-I	Vz-I	Magnitude-J	Vx-J	Vy-J	Vz		
14	Unnamed	2	1.800000	1.000000	0.000000	0.000000	1.800000	1.000000	0.000000	0.000000		

FEA Object Group 8: Beam Distributed Loads

Beam Distributed Load

ID	Description	Line ID	Magnitude-I	Vx-I	Vy-I	Vz-I	Magnitude-J	Vx-J	Vy-J	Vz		
22	Unnamed	132	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
18	Unnamed	9	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
19	Unnamed	22	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
24	Unnamed	130	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
23	Unnamed	131	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
28	Unnamed	141	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
21	Unnamed	25	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
20	Unnamed	23	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
25	Unnamed	128	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
17	Unnamed	7	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
16	Unnamed	8	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
27	Unnamed	143	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
15	Unnamed	24	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		
26	Unnamed	142	- 19.000000	0.000000	1.000000	0.000000	-19.000000	0.000000	1.000000	0.000		

FEA Object Group 9: Beam Distributed Loads

Beam Distributed Load

[illegible]

40	Unnamed	66	19.000000	0.000000	1.000000	0.000000	19.000000	0.000000	1.000000	0.000000
----	---------	----	-----------	----------	----------	----------	-----------	----------	----------	----------

FEA Object Group 10: Beam Distributed Loads

Beam Distributed Load

ID	Description	Line ID	Magnitude-I	Vx-I	Vy-I	Vz-I	Magnitude-J	Vx-J	Vy-J	Vz-J
44	Unnamed	17	10.000000	1.000000	0.000000	0.000000	10.000000	1.000000	0.000000	0.000000

FEA Object Group 11: Beam Distributed Loads

Beam Distributed Load

ID	Description	Line ID	Magnitude-I	Vx-I	Vy-I	Vz-I	Magnitude-J	Vx-J	Vy-J	Vz-J
45	Unnamed	27	-10.000000	1.000000	0.000000	0.000000	-10.000000	1.000000	0.000000	0.000000

Constraints

FEA Object Group 2: Nodal Boundary Conditions

Nodal Boundary Condition

ID	Description	Vertex ID	Node Number	Tx	Ty	Tz	Rx	Ry	Rz
5	Unnamed	142	63	Yes	Yes	Yes	No	No	No
4	Unnamed	109	49	Yes	Yes	Yes	No	No	No
3	Unnamed	74	33	Yes	Yes	Yes	No	No	No
2	Unnamed	64	28	Yes	Yes	Yes	No	No	No

FEA Object Group 12: Nodal Boundary Conditions

Nodal Boundary Condition

ID	Description	Vertex ID	Node Number	Tx	Ty	Tz	Rx	Ry	Rz
7	Unnamed	102	46	Yes	Yes	Yes	No	No	No
6	Unnamed	136	60	Yes	Yes	Yes	No	No	No

FEA Object Group 13: Nodal Boundary Conditions

Nodal Boundary Condition

ID	Description	Vertex ID	Node Number	Tx	Ty	Tz	Rx	Ry	Rz
8	Unnamed	261	98	Yes	Yes	Yes	No	No	No
9	Unnamed	264	99	Yes	Yes	Yes	No	No	No

Processor Output

Processor Summary

ALGOR (R) Static Stress with Linear Material Models
Version 20.03.01.0013 -WIN 14 -AUG-2007
Copyright (c) 2007, ALGOR, Inc. All rights reserved.

**** Memory Dynamically Allocated = 523304 KB

DATE: AUGUST 7, 2008
TIME: 11:19 AM
INPUT MODEL: C:\0stacey\0Current_design\379603 (DVS Enclosure)\DVS ALGOR\DVS FINAL1.ds_data\1\ds

PROGRAM VERSION: 2003010013
alg.dll VERSION: 2004010004
agsdb_ar.dll VERSION: 1800000000
algconfig.dll VERSION: 2002000064
algsolve.exe VERSION: 2000000463
amgsolve.exe VERSION: 3300000000

Structural

1**** CONTROL INFORMATION

number of node points	(NUMNP)	=	105
number of element types	(NELTYP)	=	1
number of load cases	(LL)	=	1
number of frequencies	(NF)	=	0
analysis type code	(NDYN)	=	0
equations per block	(KEQB)	=	0
bandwidth minimization flag	(MINBND)	=	0
gravitational constant	(GRAV)	=	3.8640E+02
number of equations	(NEQ)	=	570

**** PRINT OF NODAL DATA SUPPRESSED
**** PRINT OF EQUATION NUMBERS SUPPRESSED
**** PRINT OF TYPE -2 ELEMENT DATA SUPPRESSED
**** Hard disk file size information for processor:

Available hard disk space on current drive = 51672.816 megabytes

Gravity direction vector = 0.0000E+00 0.0000E+00 -1.0000E+00

1**** NODAL LOADS (STATIC) OR MASSES (DYNAMIC)

NODE NUMBER	LOAD CASE	X -AXIS FORCE	Y -AXIS FORCE	Z -AXIS FORCE	X -AXIS MOMENT	Y -AXIS MOMENT	Z -AXIS MOMENT
90	1	0.000E+00	0.000E+00	-1.250E+02	0.000E+00	0.000E+00	0.000E+00
91	1	0.000E+00	0.000E+00	-1.250E+02	0.000E+00	0.000E+00	0.000E+00

1**** ELEMENT LOAD MULTIPLIERS

load case	case A	case B	case C	case D	case E
1	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

**** Invoking Parallel BCSLIB -EXT Sparse Solver ...

**** Symbolic Assembling Using the Row -Hits Matrix Profile ...
**** Assembled in One Block.
**** Real Sparse Matrix Assembly ...

1**** STIFFNESS MATRIX PARAMETERS

minimum non -zero diagonal element	=	1.0137E+04
maximum diagonal element	=	7.0291E+07
maximum/minimum	=	6.9338E+03
average diagonal element	=	1.9711E+07

the minimum is found at equation 25: node=5 Tx
the maximum is found at equation 197: node=34 Ry

in the upper off -diagonal matrix:
number of entries in the profile = 9432
number of symbolic nonzero entries= 7071
number of real nonzero entries = 3037

**** Sparse Matrix Assembled in One Block
**** Load case 1


```

**** 50.1% of available memory is allocated for the sparse solver
      memory required for the in   -core solving:      373 kbs
      memory required for the out  -of-core solving:    202 kbs
      memory currently allocated:   92869 kbs
**** End Sparse Solver Solution

      Reaction Sums and Maxima for Load Case      1

      Sum of applied forces
      X -Force      Y -Force      Z -Force      X -Moment      Y -Moment      Z -Moment
      7.3409E+02    3.8000E+01    -6.3220E+03    0.0000E+00    -3.4106E -13    3.2401E -12

      Sum of reactions
      X -Force      Y -Force      Z -Force      X -Moment      Y -Moment      Z -Moment
      -9.1687E -12    3.5527E -13    -1.1902E -12    -4.4565E -11    -1.8906E -10    1.3699E -09

      Sum of residuals
      X -Force      Y -Force      Z -Force      X -Moment      Y -Moment      Z -Moment
      7.3409E+02    3.8000E+01    -6.3220E+03    -4.6757E -11    -1.8928E -10    1.3723E -09

      Sum of unfixed direction residuals
      X -Force      Y -Force      Z -Force      X -Moment      Y -Moment      Z -Moment
      3.5475E -10    2.4872E -10    2.0524E -10    -4.6757E -11    -1.8928E -10    1.3723E -09

      Largest applied forces and moments
      Node      Node      Node      Node      Node      Node
      X -Force      Y -Force      Z -Force      X -Moment      Y -Moment      Z -Moment
      12      7      56      7      15      9
      3.3000E+02    -1.5289E+03    -7.5900E+02    -1.2330E+04    4.7040E+02    5.7178E+03

      Largest nodal reactions
      Node      Node      Node      Node      Node      Node
      X -Force      Y -Force      Z -Force      X -Moment      Y -Moment      Z -Moment
      28      14      60      14      15      9
      4.2514E+02    -1.5289E+03    -1.7908E+03    -1.2330E+04    -4.7040E+02    -5.7178E+03

      Largest nodal residuals
      Node      Node      Node      Node      Node      Node
      X -Force      Y -Force      Z -Force      X -Moment      Y -Moment      Z -Moment
      28      60      60      53      95      21
      4.2514E+02    2.9023E+02    -1.7908E+03    -1.6371E -11    -1.1664E -10    9.8134E -10

      Largest unfixed direction residuals
      Node      Node      Node      Node      Node      Node
      X -Force      Y -Force      Z -Force      X -Moment      Y -Moment      Z -Moment
      12      10      38      53      95      21
      -2.2520E -09    1.9321E -10    1.2875E -10    -1.6371E -11    -1.1664E -10    9.8134E -10

```

1**** TEMPORARY FILE STORAGE (MEGABYTES)

```

-----
UNIT NO.  7 :      0.004
UNIT NO.  8 :      0.005
UNIT NO.  9 :      0.000
UNIT NO. 10 :      0.000
UNIT NO. 11 :      0.009
UNIT NO. 12 :      0.004
UNIT NO. 13 :      0.004
UNIT NO. 14 :      0.000
UNIT NO. 15 :      0.000
UNIT NO. 17 :      0.000
UNIT NO. 51 :      0.012
UNIT NO. 52 :      0.175
UNIT NO. 54 :      0.002
UNIT NO. 55 :      0.009
UNIT NO. 56 :      0.019
UNIT NO. 58 :      0.004
UNIT NO. 59 :      0.000

TOTAL      :      0.249 Megabytes

```

Processor Log

ALGOR (R) Static Stress with Linear Material Models
Version 20.03.01.0013 -WIN 14 -AUG-2007
Copyright (c) 2007, ALGOR, Inc. All rights reserved.

Structural
105 1 1 0 0 0
**** Linear stress analysis
**** Memory Dynamically Allocated = 523304 KB

```

Options executed are:

NOMIN
STRAIN
SPARSE
SUPCNF
SUPELM
SUPNOD
REAC
ENOR

processing ...

**** OPENING TEMPORARY FILES
NDYN = 0

DATE: AUGUST 7, 2008
TIME: 11:19 AM
INPUT MODEL: C:\0stacey\0Current\_design\379603 (DVS Enclosure)\DVS ALGOR\DVS FINAL1.ds_data\1\ds

PROGRAM VERSION: 2003010013
alg.dll VERSION: 2004010004
agsdb_ar.dll VERSION: 1800000000
algconfig.dll VERSION: 2002000064
algsolve.exe VERSION: 2000000463
amgsolve.exe VERSION: 330000000

**** BEGIN NODAL DATA INPUT
105 NODES

570 DOFS
**** END NODAL DATA INPUT
**** BEGIN TYPE -2 DATA INPUT
PART 1 CONTAINING 152 ELEMENTS

**** END TYPE -2 DATA INPUT
**** Hard disk file size information for processor:

Available hard disk space on current drive = 51672.816 megabytes

**** BEGIN LOAD INPUT

Gravity direction vector = 0.0000E+00 0.0000E+00 -1.0000E+00
One load case.
Load factor = 1.00E+00 in the 1st basket in load case 1
**** END LOAD INPUT

**** Invoking Parallel BCSLIB -EXT Sparse Solver ...

**** Symbolic Assembling Using the Row -Hits Matrix Profile ...
**** Assembled in One Block.
**** Real Sparse Matrix Assembly ...
in the upper off -diagonal matrix:
number of entries in the profile = 9432
number of symbolic nonzero entries= 7071
number of real nonzero entries = 3037
**** Sparse Matrix Assembled in One Block
**** Load case 1
**** End Sparse Solver Solution

**** BEGIN DISPLACEMENT OUTPUT
**** PRINT OF DISPLACEMENT OUTPUT SUPPRESSED
**** END DISPLACEMENT OUTPUT
**** BEGINNING REACTION COMPUTATIONS
**** LOADCASES REMAINING 1
**** BLOCKS REMAINING 1
**** PARTS REMAINING 1
**** ELEMENT/GLOBAL CONTRIBUTIONS Part = 1
THE 1st PART CONTAINING 152 ELEMENTS

**** ENDING REACTION COMPUTATIONS

ds.t7 = 4.461 kilobytes
ds.t8 = 5.012 kilobytes
ds.t9 = 0.000 kilobytes
ds.t10 = 0.000 kilobytes
ds.t11 = 9.562 kilobytes
ds.t12 = 4.453 kilobytes
ds.t13 = 4.461 kilobytes
ds.t14 = 0.000 kilobytes
ds.t15 = 0.000 kilobytes
ds.t17 = 0.000 kilobytes
ds.t51 = 11.875 kilobytes
ds.t52 = 179.312 kilobytes
ds.t54 = 2.250 kilobytes
ds.t55 = 9.637 kilobytes

```

```

ds.t56 = 19.273 kilobytes
ds.t58 = 4.453 kilobytes
ds.t59 = 0.000 kilobytes

total temporary disk storage (megabytes) = 0.2488

ds.l = 7.006 kilobytes
ds.do = 4.969 kilobytes

**** BEGIN DELETING TEMPORARY FILES
Processing completed for model:
[C:\0stacey\0Current\_design\379603 (DVS Enclosure)\DVS ALGOR\DVS FINAL1.ds_data\1\ds]
**** TEMPORARY FILES DELETED
**** END OF SUCCESSFUL EXECUTION

**** Total actual hard disk space used = 0.260 megabytes

Sub -total elapsed time = 0.013 minutes

ALGOR (R) Stress Calculation Utility
Version 20.03.01.0013 -WIN 14 -AUG-2007
Copyright (c) 2007, ALGOR, Inc. All rights reserved.

**** Memory Dynamically Allocated = 523304 KB

DATE: AUGUST 7, 2008
TIME: 11:19 AM
INPUT.....C:\0stacey\0Current\_design\379603 (DVS Enclosure)\DVS ALGOR\DVS FINAL1.ds_data\1\ds
**** BEGIN TYPE -2 DATA INPUT
152 ELEMENTS

**** END TYPE -2 DATA INPUT
**** Writing stress and strain output files ...

**** Hard disk file size information for postprocessor:
ds.son = 26.254 kilobytes
ds.nso = 11.922 kilobytes
ds.sto = 11.922 kilobytes

Total MKNSO disk space used = 0.04892 megabytes
**** End of successful execution
**** MKNSO elapsed time = 0.002 minutes

**** The TOTAL elapsed time = 0.015 minutes

```

Stress Analysis

The stress analysis output file (C:\0stacey\0Current_design\379603 (DVS Enclosure)\DVS ALGOR\DVS FINAL1.ds_data\1\ds.S) was not found.

Weight and Center of Gravity Analysis

```

ALGOR (R) Weight and Center of Gravity
Version 20.00.00.0463 -WIN 21 -MAR-2007
Copyright (c) 2007, ALGOR, Inc. All rights reserved.

DATE: AUGUST 7,2008
TIME: 08:52 AM
INPUT FILE.....C:\0stacey\0Current\_design\379603 (DVS Enclosure)\DVS ALGOR\DVS FINAL1.ds_data\1\ds

LinearStress

Structural

Input information:

Number of nodes = 103
Number of element types = 1
Analysis code (NDYN) = 0
Gravitational constant = 3.86400E+02

Element type = 2 (3 -D Beam)
Number of elements = 150

```

Mat.#	Mass Density	Weight Density
1	7.3500E -04	2.8400E -01

===== Output results for Part 1 =====

I. Volume, Weight and C.G. (Global coordinates):

Volume	Weight	XC	YC	ZC
5.1142E+03	1.4525E+03	-2.4787E+01	1.2327E+02	9.5216E+00

II. Moment of inertia w.r.t. X -Y-Z axes at (XR,YR,ZR):
Reference point (XR,YR,ZR) is at (0.000E+00, 0.000E+00, 0.000E+00)

MASS moment of inertia

Ixx	Iyy	Izz
6.5532E+04	1.3883E+04	6.8223E+04

MASS product of inertia

Ixy	Ixz	Iyz
-1.1504E+04	-8.3457E+02	4.4252E+03

AREA moment of inertia not calculated.

The following concentrated MASSES and MASS moment of inertia are given in the input file:

"ID" is a value calculated by SSAP9 based on KEY,NDYN,LC values given in the input file

ID="Y": Input weight/mass is included in the calculation
(Data echoed below are the CONVERTED values)
ID="N": Input weight/mass is NOT included in the calculation
(Data echoed below are the original input values)

Node	LC	X	-mass	Y	-mass	Z	-mass	X	-moment	Y	-moment	Z	-moment	KEY	ID
90	1	0.000E+00	0.000E+00			-0.125E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0	N		
91	1	0.000E+00	0.000E+00			-0.125E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0	N		

===== Output results =====

I. Volume, Weight and C.G. (Global coordinates):

Volume	Weight	XC	YC	ZC
5.1142E+03	1.4525E+03	-2.4787E+01	1.2327E+02	9.5216E+00

II. Moment of inertia w.r.t. X -Y-Z axes at (XR,YR,ZR):
Reference point (XR,YR,ZR) is at (0.000E+00, 0.000E+00, 0.000E+00)

MASS moment of inertia

Ixx	Iyy	Izz
6.5532E+04	1.3883E+04	6.8223E+04

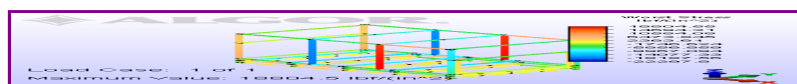
MASS product of inertia

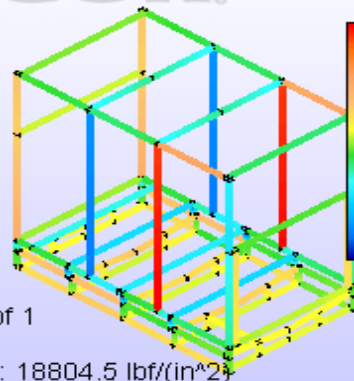
Ixy	Ixz	Iyz
-1.1504E+04	-8.3457E+02	4.4252E+03

AREA moment of inertia not calculated.

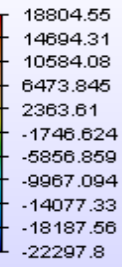
Meshing Results

Superview Presentation Images





Worst Stress
lbf/(in²)



Load Case: 1 of 1

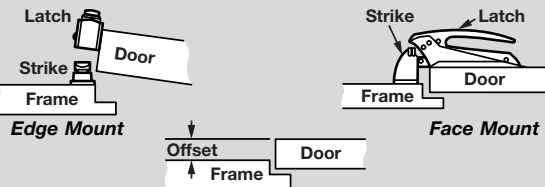
Maximum Value: 18804.5 lbf/(in²)

Minimum Value: -22297.8 lbf/(in²)



Push-to-Close Latches

About Door Edge-Mount and Door Face-Mount Push-to-Close Latches

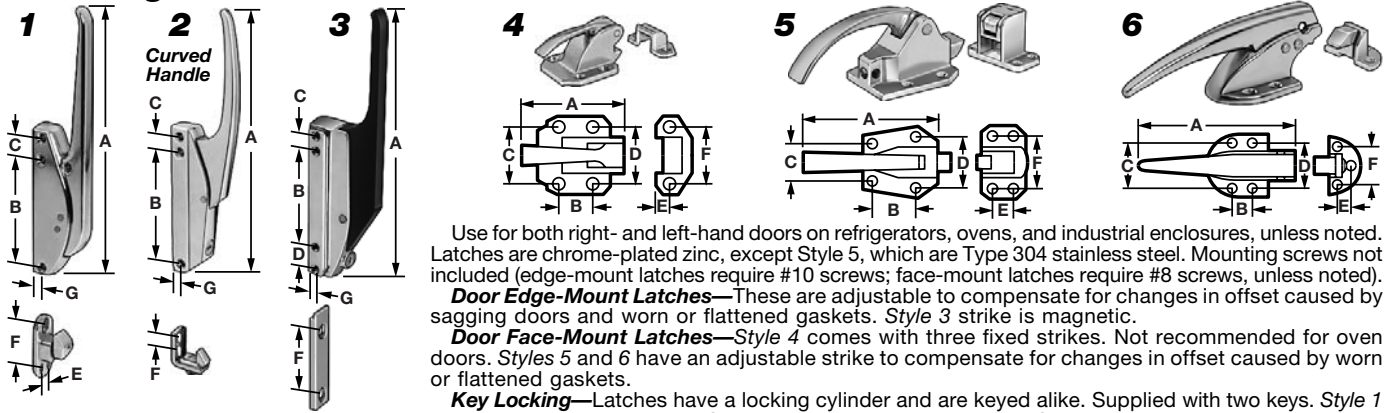


The push-to-close latches on this page are commonly used on refrigerator, oven, and industrial enclosure doors.

Door edge-mount latches mount vertically to the side edge of the door with the strike mounted behind it on the face of the frame. Latches need at least a 3/4" offset (space between front of the door and front of the frame).

Door face-mount latches mount horizontally to the front of the door with the strike mounted adjacent to it on the frame. Face-mount latches can mount to a door that is flush with the frame, or where there is some offset.

Door Edge-Mount and Door Face-Mount Latches



Use for both right- and left-hand doors on refrigerators, ovens, and industrial enclosures, unless noted. Latches are chrome-plated zinc, except Style 5, which are Type 304 stainless steel. Mounting screws not included (edge-mount latches require #10 screws; face-mount latches require #8 screws, unless noted).

Door Edge-Mount Latches—These are adjustable to compensate for changes in offset caused by sagging doors and worn or flattened gaskets. Style 3 strike is magnetic.

Door Face-Mount Latches—Style 4 comes with three fixed strikes. Not recommended for oven doors. Styles 5 and 6 have an adjustable strike to compensate for changes in offset caused by worn or flattened gaskets.

Key Locking—Latches have a locking cylinder and are keyed alike. Supplied with two keys. Style 1 all open with key number 541. Style 2 all open with key number 01. Style 3 all open with key number 1313.

Door Edge-Mount Latches—Require minimum 3/4" offset between the front of the door and the front of the frame.

	Projection	(A)	Center-to-Center					(G) ♦	Max. Padlock Shackle Dia.	Straight Handle Each	Curved Handle Each
			(B)	(C)	(D)	(E)	(F)				
Padlockable	1	1 29/32"	9 5/16"	3 3/4"	3/4"	1/2"	1 5/8"	3/8"	5/16"	1268A1	\$76.20
Key Locking	1	1 29/32"	10 11/16"	5 1/8"	3/4"	1/2"	1 5/8"	3/8"		1268A3	116.51
	2	2 5/8"	10 1/2"	4 5/8"	5/8"		1 5/32"	3/8"		15775A23	32.03
	3	2 7/8"	11 1/2"	4 3/16"	5/8"	1"	3 1/2"	3/8"		15775A31 ♥	64.77

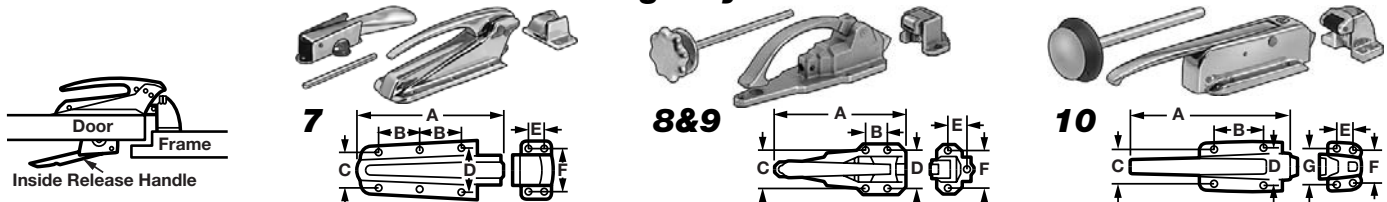
♦ Center of screw hole to edge of latch. ■ Projection is 1 15/16" for straight handle. ♥ Handle is black composite.

Door Face-Mount Latches

	Proj.	(A)	Center-to-Center					Max. Padlock Shackle Dia.	For Smaller Offsets Offset Range	Each	For Larger Offsets Offset Range	Each
			(B)	(C)	(D)	(E)	(F)					
Nonlocking	4	1 1/8"	2 1/8"	1 1/16"	1 1/8"	1 1/8"	9/32"	1 1/8"	0", 1/8", and 3/8"	15755A13 ♣	\$19.60	
	4	1 5/16"	2 1/16"	7/8"	1 13/32"	1 13/32"	1 13/32"	1 13/32"	0", 1/8", and 3/8"	15755A11	32.71	
Padlockable	5	1 3/4"	4 1/4"	1 3/8"	1 3/32"	1 5/8"	5/8"	1 5/8"	0" to 1/2"	1256A3	63.10	9/16" to 1 1/4" 1256A4 ✓ \$66.91
	5	2 11/16"	5 1/4"	1 1/4"	1 3/4"	2 1/16"	2 5/32"	2 1/16"	0" to 3/8"	1256A1 ★	82.28	1/2" to 1 1/4" 1256A2 ★ 87.67
	6	1 3/16"	5 1/4"	1 3/16"	1 11/32"	1 1/16"	1 1/2"	1 1/2"	0" to 3/8"	1266A6 •	52.61	5/8" to 1 1/4" 1266A7 • ♠ 52.61
	6	2 1/32"	5 57/64"	1 3/16"	1 11/32"	1 1/2"	1 5/32"	1 1/2"	0" to 3/8"	1266A5	72.20	3/4" to 1 1/4" 1266A1 ▲ 82.28

♣ Requires #6 screws. ✓ Projection is 2 1/4". ★ Requires #10 screws. • Requires #9 screws. ♠ Projection is 1 11/16". ▲ (E) dimension is 7/8".

Door Face-Mount Latches with Emergency Release Handle



An emergency release handle offers a means of escape if the door accidentally closes with someone on the inside. Use for both right- and left-hand doors on walk-in freezers and coolers, ovens, paint booths, and industrial enclosures. Latches **with fiberglass rods** are ideal for freezers because they work in temperatures down to -40° F.

Strikes are adjustable to compensate for worn or flattened gaskets. They require 1/4" mounting screws (not included). Style 10 also requires

#10 screws for mounting the inside release handle.

Styles 7 and 10 have a chrome-plated die cast zinc body and strike with a chrome-plated malleable iron handle. Style 8 is iron with a silver powder-coated finish. Style 9 is Type 304 stainless steel.

Key Locking—Style 10 has a locking cylinder and is keyed alike (all open with key number 105). Furnished with two keys. Style 10 latches for smaller offsets are good for recessed doors.

	Proj.	(A)	Center-to-Center					Max. Padlock Shackle Dia.	For Smaller Offsets Offset Range	Each	For Larger Offsets Offset Range	Each
			(B)	(C)	(D)	(E)	(F)	(G)				
Padlockable—Steel Release Handle with Steel Rod	7	3 31/32"	11 3/4"	3 5/16"	2 7/8"	3 3/8"	1 1/4"	3 1/4"	1 1/32"	0" to 3/16"	1267A1	\$493.61
Padlockable—Steel Release Handle with Fiberglass Rod	7	3 31/32"	11 3/4"	3 5/16"	2 7/8"	3 3/8"	1 1/4"	3 1/4"	1 1/32"	0" to 3/16"	1267A25	572.22
Padlockable—Cast Iron Release Handle with Steel Rod	8	3 1/2"	8"	1 3/4"	2 3/8"	2 3/8"	1 3/16"	2 7/16"	1/4"	0" to 1/2"	1840A23	49.91
	8	4 1/8"	10 5/8"	1 5/16"	3"	1 1/2"	3 3/8"	3 3/8"	1/4"	0" to 1 1/16"	1840A12	77.05
Padlockable—Stainless Steel Release Handle with Stainless Steel Rod	9	3 1/2"	8"	1 3/4"	2 3/8"	2 3/8"	1 3/16"	2 7/16"	5/16"	0" to 1/2"	1840A31	164.96
Key Locking—Plastic Release Handle with Steel Rod	10	2 1/4"	11"	3 3/8"	2 1/8"	2 1/2"	2 9/32"	2 9/32"	2 9/16"	-1/8" to +1/4"	1354A304	238.95
Key Locking—Plastic Release Handle with Fiberglass Rod	10	2 1/4"	11"	3 3/8"	2 1/8"	2 1/2"	2 9/32"	2 9/32"	2 9/16"	-1/8" to +1/4"	1354A424	246.34

Models 802-U, 807-U, 810-U, 812-U, 847-U

Cylinder horizontal

Model n	Maximum Holding Capacity		Exerting Force @ 80 PSI		Max. Operating Pressure [PSI]	Port Size	Weight	Standard equipment
	Inner	Outer	Inner	Outer				
802-U	200	110	200	160	40	1/8 NPT	1.60	202208-M
807-U	375	275	350	150	55	1/8 NPT	2.30	507107 (flanged washers)
810-U	600	290	600	400	70	1/8 NPT	4.07	235106 (flanged washers)
812-U	100	55	135	96	80	10-32 NF	0.46	305208-M
847-U	1,000	480	750	450	60	1/8 NPT	8.93	247109 (flanged washers)

ALSO AVAILABLE

With Viton Seals

- Model 802-U-HT ▲
- Model 807-U-HT ▲
- Model 810-U-HT ▲
- Model 812-U-HT ▲
- Model 847-U-HT ▲

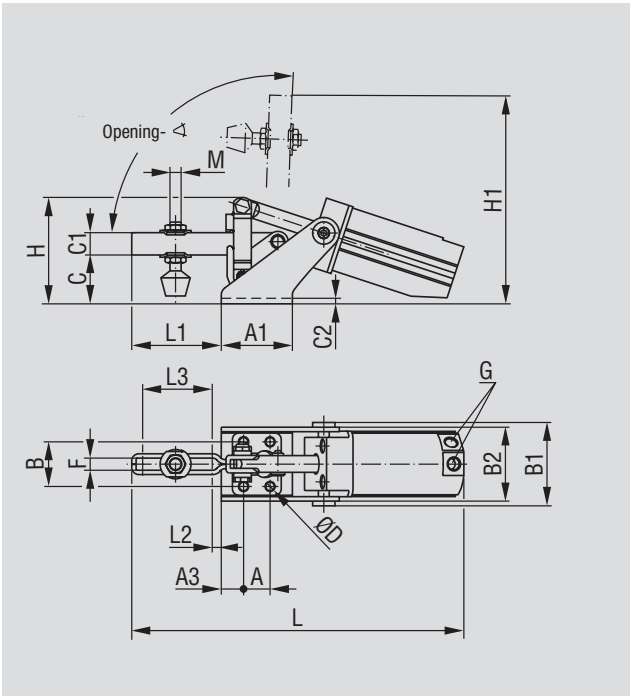
Switch Options

Pages 13.1–13.4

See accessories beginning on pages 9.1 and 13.1.

▲ Available upon request, as are a number of other modifications

Magnetic Ring
Now A
Standard Feature



Model 807-U



Model 812-U

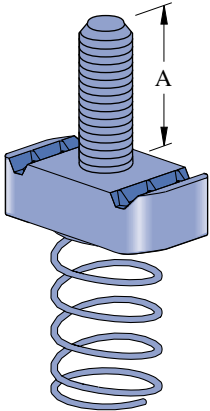


Model 847-U

Model no.	A	A1	A3	B	B1	B2	C	C1	C2	øD	F	H	H1	L	L1	L2	L3	M	Opening angle +/-5°
802-U	0.50	1.50	0.25	1.06	2.22	1.93	1.04	0.38	0.24	0.22	0.28	2.58	3.82	7.69	1.73	0.50	0.99	M6	95°
807-U	0.75	2.00	0.63	1.24	2.26	2.06	1.38	0.63	0.25	0.28	0.34	3.02	5.98	9.05	2.51	0.26	2.23	M8	92°
810-U	1.25	4.22	0.38	1.79	3.07	2.86	1.79	0.79	0.24	0.33	0.40	3.79	7.28	12.32	3.57	0.86	2.35	M10	95°
812-U	0.63	1.00	0.18	0.94	1.54	1.50	0.68	0.31	0.13	0.18	0.22	1.53	–	5.59	1.02	0.11	0.75	M5	90°
847-U	1.25	6.22	0.38	1.78	3.62	3.56	2.25	0.88	0.44	0.34	0.53	4.40	–	15.95	4.87	1.36	3.14	M12	95°

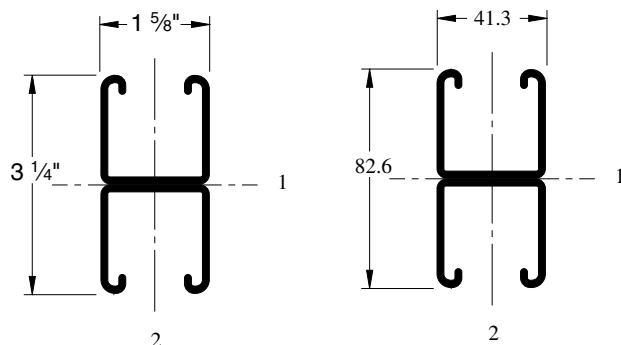


Channel Stud Nut With Spring

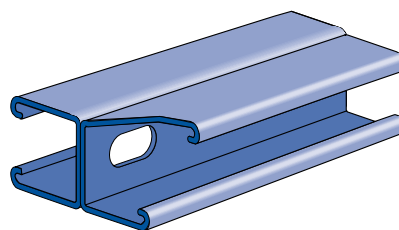
	Channel nut Part number	Nut Size Thread	Stud In (mm)	"A" Wt/100 pcs Lbs (kg)	For Use With Channel P1000, P1100, P2000, P3000
 <p>All Stud Nut grooves are serrated. Special stud lengths and thread lengths can be supplied upon request.</p> <p>■ Acceptable for use</p>	P2378-1	1/4" -20	1 25.4	8 3.6	■
	P2378-2		1 1/4 31.8	9 4.1	■
	P2378-3		1 1/2 38.1	9 4.1	■
	P2379-1	5/16" -18	1 25.4	12 5.4	■
	P2379-2		1 1/4 31.8	12 5.4	■
	P2379-3		1 1/2 38.1	13 5.9	■
	P2380-1	3/8" -16	1 25.4	13 5.9	■
	P2380-2		1 1/4 31.8	13 5.9	■
	P2380-3		1 1/2 38.1	13 5.9	■
	P2380-4		1 3/4 44.5	15 6.8	■
	P2380-5		2 50.8	16 7.3	■
	P2380-6		2 1/4 57.2	16 7.3	■
	P2381-2	1/2" -13	1 25.4	14 6.4	■
	P2381-3		1 1/4 31.8	15 6.8	■
	P2381-4		1 1/2 38.1	17 7.7	■
	P2381-5		1 3/4 44.5	18 8.2	■
	P2381-6		2 50.8	19 8.6	■
	P2381-7		2 1/4 57.2	20 9.1	■
	P2382-2	5/8" -11	1 1/4 31.8	18 8.2	■
	P2382-3		1 1/2 38.1	20 9.1	■



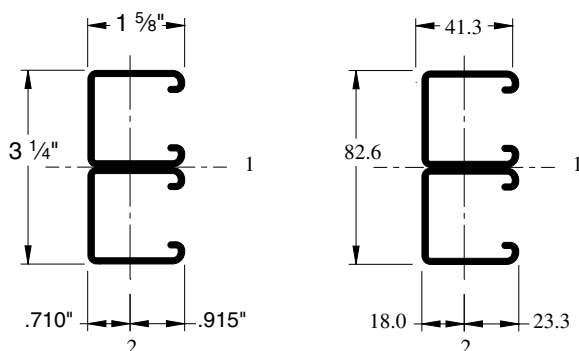
P1001 T



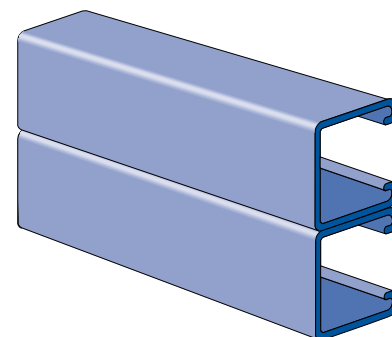
Wt/100 Ft: 378 Lbs (562 kg/100 m)
Allowable Moment 14,360 In-Lbs (1,620 N•m)
12 Gauge Nominal Thickness .105" (2.7mm)



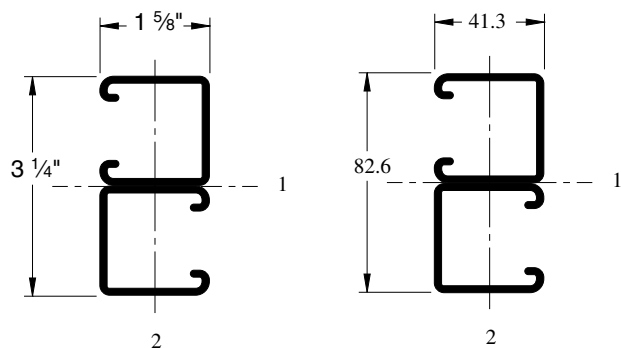
P1001 A



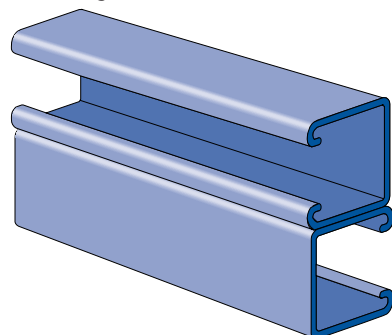
Wt/100 Ft: 378 Lbs (562 kg/100 m)
Allowable Moment 18,640 In-Lbs (2,110 N•m)
12 Gauge Nominal Thickness .105" (2.7mm)



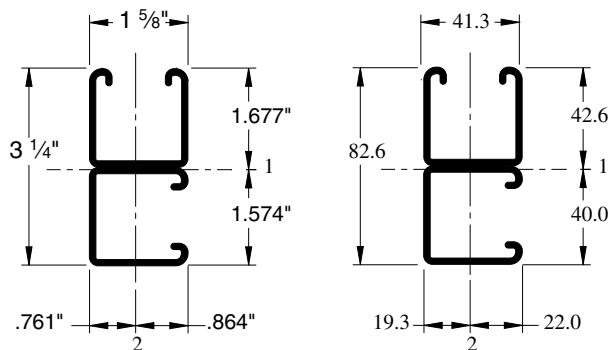
P1001 B



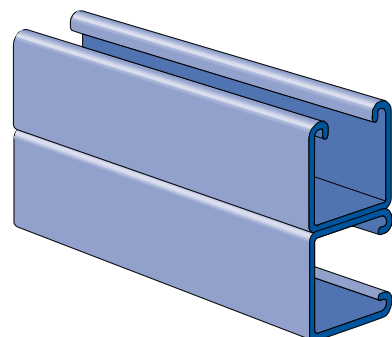
Wt/100 Ft: 378 Lbs (562 kg/100 m)
Allowable Moment 18,640 In-Lbs (2,110 N•m)
12 Gauge Nominal Thickness .105" (2.7mm)



P1001 C



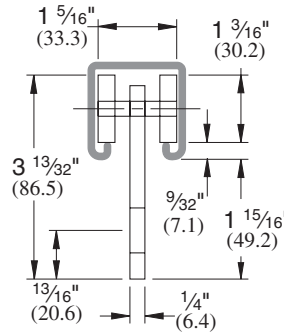
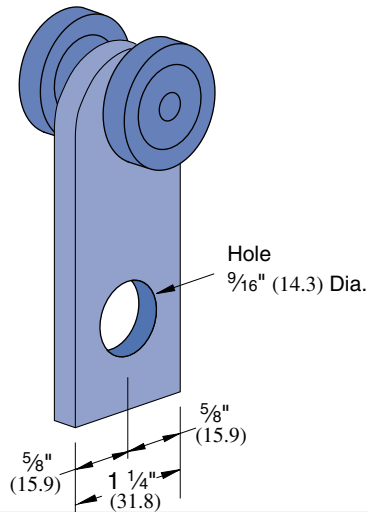
Wt/100 Ft: 378 Lbs (562 kg/100 m)
Allowable Moment 15,950 In-Lbs (1,800 N•m)
12 Gauge Nominal Thickness .105" (2.7mm)



Channel Finishes: PL, GR, HG, PG; Standard Lengths: 10' & 20'

P2949

Wt/100 pcs: 46 Lbs (20.9 kg)

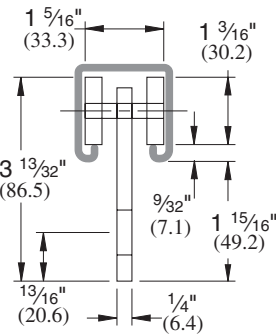
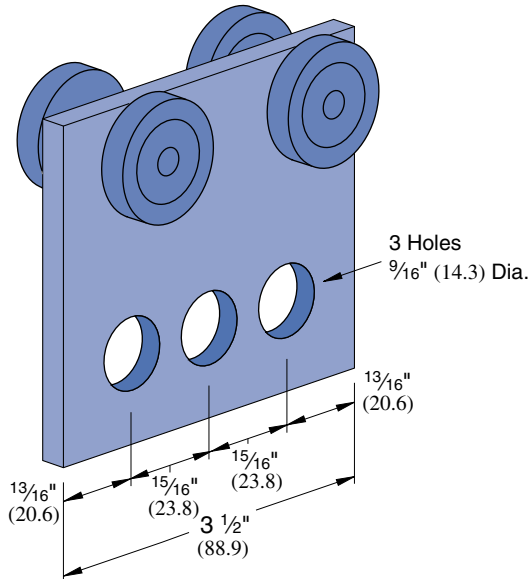


FPM	RPM	Design Load In P1000 Lbs (kg)
180	600	150 68.0
90	300	225 102.1
30	100	437 198.2

Wheel bearings are stainless steel.
Do not lubricate.

P2950

Wt/100 pcs: 110 Lbs (49.9 kg)



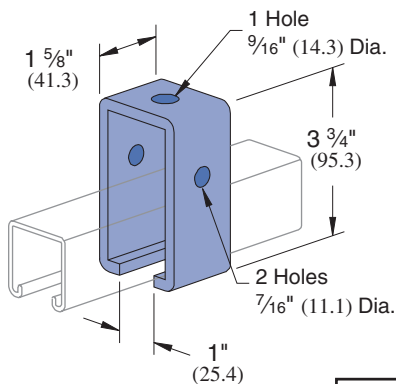
FPM	RPM	Design Load In P1000 Lbs (kg)
180	600	300 136.1
90	300	450 204.1
30	100	600 272.2

Wheel bearings are stainless steel.
Do not lubricate.

P1834

Channel Trolley Support

Wt/100 pcs: 102 Lbs (46.3 kg)



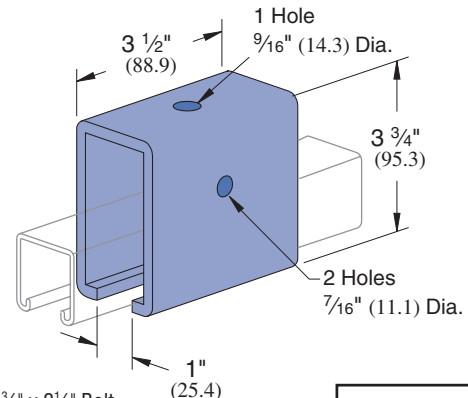
Requires $\frac{3}{8}$ " x $2\frac{1}{2}$ " Bolt
and $\frac{3}{8}$ " Nut
(not included)

Design Load
1200 Lbs (544.3 kg)

P1834A

Channel Trolley Support

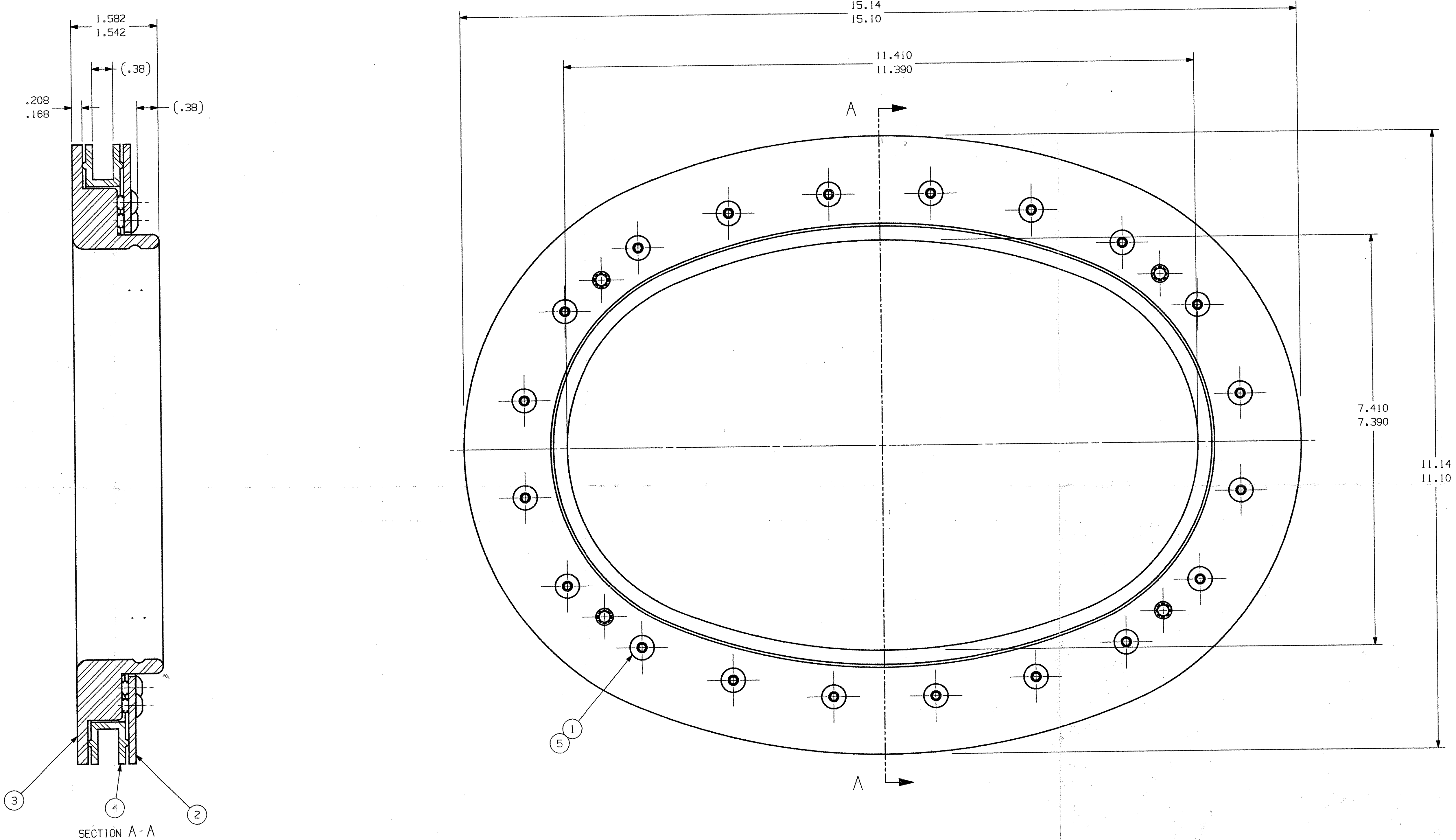
Wt/100 pcs: 220 Lbs (99.8 kg)



Requires $\frac{3}{8}$ " x $2\frac{1}{2}$ " Bolt
and $\frac{3}{8}$ " Nut
(not included)

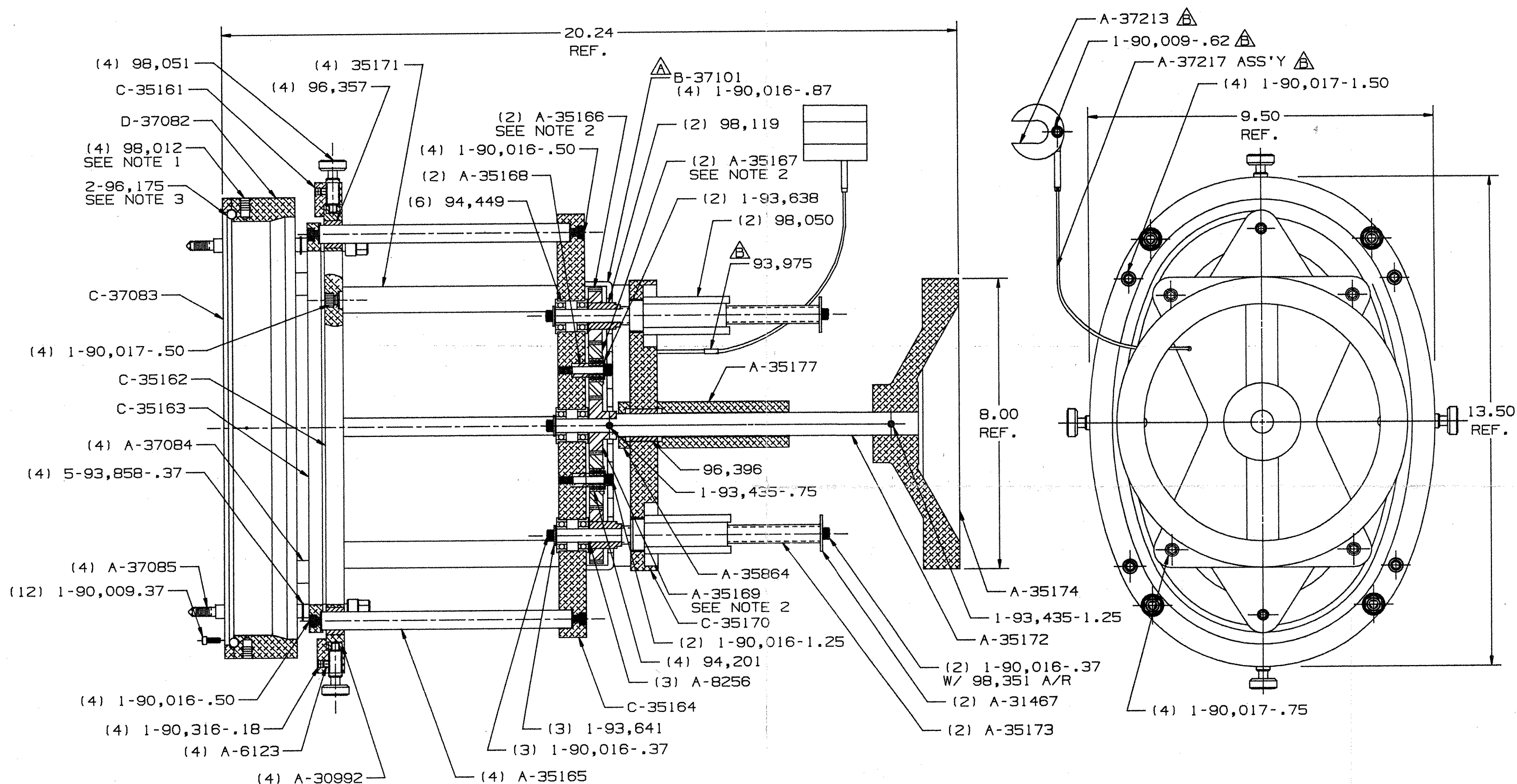
Design Load
2500 Lbs (1,134.0 kg)

REVISIONS					DATE	APPROVED
REV	ZONE	ECO	DESCRIPTION			
A	C-2	4986	DELETED UNMEASUREABLE DIMENSIONS 9.580/9.540 AND 13.580/13.540		09/15/04	SKP



ITEM	PART NO.	DESCRIPTION	MATERIAL	QTY
1	1-90117-.50	BHCS, 1/4-20 X .50	SS 18-8	20
2	38208	CLAMP RING	SS 316L	1
3	38209	OVAL PORT CONFIGURATION	SS 316L	1
4	39582	CHANNEL GASKET	EPDM	1
5	98158	THREAD LUBRICANT	-	A/R

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES ANGLES 1" = 1"		CENTRAL RESEARCH LABORATORIES 250 Highway 18 Boulevard Red Wing, MN 55066 A DOVER COMPANY	
TITLE OVAL ENCLOSURE RING ASSEMBLY		REV A	
APPROVED CEJ	DATE 08/02/95	SIZE D	DRIVING NUMBER 39583
CHECKED	DATE	SCALE FULL	SHEET 1 OF 1
DRAWN TJL	DATE 08/02/95		



NOTE 1:

(4) PURGING PORTS 1/16-27 NPT
PLUGGED WITH PIPE PLUGS.
PLUGS MUST BE FLUSH.

NOTE 2:

APPLY MOLYCOTE TO GEAR TRAIN.

NOTE 3:

APPLY LIGHT COAT OF SILCONE.

UNLESS OTHERWISE SPECIFIED						CENTRAL RESEARCH LABORATORIES		
ANGLES						Red Wing, Minnesota 55066		
±						A DOVER DIVERSIFIED COMPANY		
DOES NOT APPLY TO DR. AND RM. HOLES						PURGING AND EJECTION TOOL ASSEMBLY (OVAL)		
DRAWN TO A.S.I. STD. Y14.5 1973						NAME		
BREAK SHARP EDGES .015 MAX.						DWG. C- 36534 P/L 2 PAGES		
DO NOT SCALE DRAWING						SCALE 1:2		
REV.	LOC.	E.C.O.	WAS	BY	DATE	DR. M.A.P.	DATE 5-8-92	HEAT TREATMENT
B	G-3	---	ADDED	MAP	8-31-92	APP. C.R.	DATE 5-8-92	FINISH ---
A	F-5	---	ADDED	MAP	8-18-92	CK'D.	DATE	SCALE 1:2

INSTALLATION, OPERATION AND
MAINTENANCE MANUAL FOR THE
OVAL SEALED PASS-THROUGH
ENCLOSURE SYSTEM

1	General Description	p. 2
2	Installation Instructions	p. 2
3	Operational Instructions	p. 3
3.1	Glove Replacement Procedure	p. 3
3.2	Plug Replacement Procedure.....	p. 4
3.3	Bag Replacement Procedure	p. 6
3.4	Safety Cover Installation Procedure	p. 8
4	Maintenance Instructions	p. 8
5	Suggested Spare Parts List	p. 9
6	Drawing List.....	p. 9

1 GENERAL DESCRIPTION

The Oval Sealed Pass-Through Enclosure System is a means of providing a sealed penetration into a contained area using a glove, bag, or plug while maintaining the integrity of the contained area during the replacement or transfer procedure. The Purging and Ejection Tool Assembly provides a means of preventing outside air from entering the contained area when changing a glove, plug, or bag, thereby maintaining the integrity of the contained area.

2 INSTALLATION INSTRUCTIONS

This port is designed to be installed in a 0.375 inch (10 mm) thick panel. The panel penetration for the oval port shall conform to the dimensions shown on the CRL Drawing C-37096.

- 2.1 Make sure the panel penetration is clean, smooth and free of sharp edges or burrs.
- 2.2 Install the Channel Gasket on the penetration in the panel.
- 2.3 Check the tapped holes in the enclosure ring assembly to be sure that an anti-galling lubricant has been applied to the threaded holes. If not lubricate the threaded holes with an anti-galling lubricant.
- 2.4 Install the oval port enclosure ring from the inside of the enclosure. If permissible, it will make it easier to insert the port into the channel gasket if a small amount of vacuum grease is applied to the inside edge of the channel gasket.
- 2.5 Place the clamp ring over the oval port from the outside and install the twenty 1/4-20 Binding Head Cap Screws (1-90117-0.50) loosely in the locations shown on the assembly drawing. You will note on the assembly drawing there are four locations that do not receive screws. These locations are used for mounting the Ejection Tool Assembly.
- 2.6 Progressively tighten the screws while making sure that the clamp ring is centered on the holes for mounting the tool so it will not interfere with mounting the tool. The screws should be tightened to 140 in-lb (16 N-m) with a torque wrench.

3 OPERATIONAL INSTRUCTIONS

3.1 Operational Procedure for Replacing a Glove Assembly

This procedure is used for replacing a glove in an existing Enclosure Ring Assembly. It is assumed that the Enclosure Ring Assembly has a glove, plug, or bag assembly installed in the port.

- 3.1.1 Remove the O-ring from the Oval Support Ring Assembly.
- 3.1.2 Place the bead of the glove into the narrow groove of the Oval Support Ring Assembly.
- 3.1.3 Install the O-ring over the glove and into the wide groove of the Support Ring. Make sure the glove is not wrinkled under the O-ring and that the bead of the glove is still in the narrow groove. This unit will be referred to as the Glove Support Ring Sub-Assembly.
- 3.1.4 Retract the Purging and Ejection Tool by turning the Handwheel (A-35174) counterclockwise.
- 3.1.5 Retract the four Spring Plungers (98051) and remove the Swaging Collar from the Ejection Tool.
- 3.1.6 Install the Glove Support Ring Sub-Assembly into the Swaging Collar, orienting the thumb of the glove so it will be in the 'up' position when the glove is installed in the port.
- 3.1.7 Engage and lock the Swaging Collar to the Glove Ejection Tool.
- 3.1.8 Invert the glove into the Inner Cage of the Ejection Tool.
- 3.1.9 Orient the Ejection Tool on the Enclosure Ring Assembly making sure the thumb of the glove is in the 'up' position. Tighten the four Clamp Screws (Ref. A-37085) finger tight to hold the tool to the Enclosure Ring. With a wrench tighten the four Clamp Screws 3/4 of a turn from the finger tight position to seal the Swaging Collar on the tool to the Enclosure Ring Assembly.
- 3.1.10 Slip the Purging Stop (A-37213) on the Handwheel Drive Shaft between the Handwheel and the aluminum stop (A-35177). Open the purging valve on the Swaging Collar venting the system to atmospheric pressure so the pressure between components that are being changed does not build up when the new component is pushed into the purging position.

NOTE: The Swaging Collar has four 1/16-27 NPT pipe tapped holes located on the major and minor axis of the oval shape. These holes are plugged with

pipe plugs when shipped from Central Research Laboratories. The customer should provide the necessary piping and valving for purging the system when components are changed using the 1/16-27 NPT tapped holes that are most convenient for their use.

- 3.1.11 Turn the Handwheel of the Ejection Tool clockwise until the Handwheel bottoms on the Purging Stop (A-37213). The space between the new glove and the component being replaced can now be purged using valving on the Swaging Collar.

NOTE: The Glove Support Ring Sub-Assembly has a larger outside dimension than the inside dimension of the Enclosure Ring and Swaging Collar. The Glove Support Ring Sub-Assembly will be uniformly compressed to the dimension of the Enclosure Ring as it is being pushed into the Swaging Collar and it will seal to the Swaging Collar. The Purging Stop will stop the Glove Support Ring Assembly in the Swaging Collar without disturbing the component being replaced.

- 3.1.12 Purge the space between the old component and the new component. When the purging process is completed, back the Handwheel off just far enough to remove the stop described in Step 3.1.10.
- 3.1.13 Working through the spokes of the Ejection Tool, apply a very light pull force on the glove to prevent any excess glove material from bunching up over the front face of the Support Ring. Rotate the Handwheel clockwise until the Handwheel stops on the aluminum stop on the Handwheel Drive Shaft.
- 3.1.14 At this point, the new Glove Support Ring Sub-Assembly will have been ejected from the Glove Ejection Tool and the Glove Support Ring Sub-Assembly will have expanded out, compressing the O-ring between the glove and the inside of the Enclosure Ring. The ridge of the Support Ring will be seated in the groove on the inside of the Enclosure Ring. The old Glove, Plug, or Bag Assembly will have been pushed into the enclosure.
- 3.1.15 Retract the Inner Housing of the Glove Ejection Tool with a counter-clockwise rotation of the hand wheel and remove the Glove Ejection Tool Assembly from the Enclosure Ring Assembly.

3.2 Operational Procedure for Replacing a Plug Assembly

This procedure is used for replacing a plug in an existing Enclosure Ring Assembly. It is assumed that the Enclosure Ring Assembly has a glove, plug, or bag assembly installed in the port.

- 3.2.1 Retract the Purging and Ejection Tool by turning the Handwheel (A-35174) counterclockwise.

- 3.2.2 Retract the four Spring Plungers (98051) and remove the Swaging Collar from the Ejection Tool.
- 3.2.3 Install the Oval Plug Assembly into the Swaging Collar, orienting the plug so the solid end of the plug enters the Enclosure Ring first.
- 3.2.4 Engage and lock the Swaging Collar to the Glove Ejection Tool.
- 3.2.5 Orient the Ejection Tool on the Enclosure Ring Assembly and tighten the four Clamp Screws (Ref. A-37085) finger tight to hold the tool to the Enclosure Ring. With a wrench tighten the four Clamp Screws 3/4 of a turn from the finger tight position to seal the Swaging Collar on the tool to the Enclosure Ring Assembly.
- 3.2.6 Slip the Purging Stop (A-37213) on the Handwheel Drive Shaft between the Handwheel and the aluminum stop (A-35177). Open the purging valve on the Swaging Collar, venting the system to atmospheric pressure so the pressure between components that are being changed does not build up when the new component is pushed into the purging position.

NOTE: The Swaging Collar has four 1/16-27 NPT pipe tapped holes located on the major and minor axis of the oval shape. These holes are plugged with pipe plugs when shipped from Central Research Laboratories. The customer should provide the necessary piping and valving for purging the system when components are changed using the 1/16-27 NPT tapped holes that are most convenient for their use.

- 3.2.7 Turn the Handwheel of the Ejection Tool clockwise until the Handwheel bottoms on the Purging Stop (A-37213). The space between the new plug and the component being replaced can now be purged using valving on the Swaging Collar.

NOTE: The Oval Plug Assembly has a larger outside dimension than the inside dimension of the Enclosure Ring and Swaging Collar. The Oval Plug Assembly will be uniformly compressed to the dimension of the Enclosure Ring as it is being pushed into the Swaging Collar and it will seal to the Swaging Collar. The Purging Stop will stop the Oval Plug Assembly in the Swaging Collar without disturbing the component being replaced.

- 3.2.8 Purge the space between the old component and the new component. When the purging process is completed, back the Handwheel off just far enough to remove the stop described in Step 3.2.6.
- 3.2.9 Rotate the Handwheel clockwise until the Handwheel stops on the aluminum stop on the Handwheel Drive Shaft.

- 3.2.10 At this point, the new Oval Plug Assembly will have been ejected from the Glove Ejection Tool and the Oval Plug Assembly will have expanded out, compressing the O-ring between the plug and the inside of the Enclosure Ring. The ridge of the plug will be seated in the groove on the inside of the Enclosure Ring. The old Glove, Plug, or Bag Assembly will have been pushed into the enclosure.
- 3.2.11 Retract the Inner Housing of the Glove Ejection Tool with a counter-clockwise rotation of the Handwheel and remove the Glove Ejection Tool Assembly from the Enclosure Ring Assembly.

3.3 Operational Procedure for Replacing a Bag Assembly

This procedure is used for replacing a bag in an existing Enclosure Ring Assembly. It is assumed that the Enclosure Ring Assembly has a glove, plug, or bag assembly installed in the port.

- 3.3.1 Remove the O-ring from the Oval Support Ring Assembly.
- 3.3.2 Place the bead of the bag into the narrow groove of the Oval Support Ring Assembly.
- 3.3.3 Install the O-ring over the bag and into the wide groove of the Support Ring. Make sure the bag is not wrinkled under the O-ring and that the bead of the bag is still in the narrow groove. This unit will be referred to as the Bag Support Ring Sub-Assembly.
- 3.3.4 Retract the Purging and Ejection Tool by turning the Handwheel (A-35174) counterclockwise.
- 3.3.5 Retract the four Spring Plungers (98051) and remove the Swaging Collar from the Ejection Tool.
- 3.3.6 Install the Bag Support Ring Sub-Assembly into the Swaging Collar.
- 3.3.7 Engage and lock the Swaging Collar to the Glove Ejection Tool.
- 3.3.8 Invert the bag into the Inner Cage of the Ejection Tool.
- 3.3.9 Orient the Ejection Tool on the Enclosure Ring Assembly and tighten the four Clamp Screws (Ref. A-37085) finger tight to hold the tool to the Enclosure Ring. With a wrench tighten the four Clamp Screws 3/4 of a turn from the finger tight position to seal the Swaging Collar on the tool to the Enclosure Ring Assembly.
- 3.3.10 Slip the Purging Stop (A-37213) on the Handwheel Drive Shaft between the Handwheel and the aluminum stop (A-35177). Open the purging valve

on the Swaging Collar, venting the system to atmospheric pressure so the pressure between components that are being changed does not build up when the new component is pushed into the purging position.

NOTE: The Swaging Collar has four 1/16-27 NPT pipe tapped holes located on the major and minor axis of the oval shape. These holes are plugged with pipe plugs when shipped from Central Research Laboratories. The customer should provide the necessary piping and valving for purging the system when components are changed using the 1/16-27 NPT tapped holes that are most convenient for their use.

- 3.3.11 Turn the Handwheel of the Ejection Tool clockwise until the Handwheel bottoms on the Purging Stop (A-37213). The space between the new bag and the component being replaced can now be purged using valving on the Swaging Collar.

NOTE: The Bag Support Ring Sub-Assembly has a larger outside dimension than the inside dimension of the Enclosure Ring and Swaging Collar. The Bag Support Ring Sub-Assembly will be uniformly compressed to the dimension of the Enclosure Ring as it is being pushed into the Swaging Collar and it will seal to the Swaging Collar. The Purging Stop will stop the Bag Support Ring assembly in the Swaging Collar without disturbing the component being replaced.

- 3.3.12 Purge the space between the old component and the new component. When the purging process is completed, back the Handwheel off just far enough to remove the stop described in Step 3.3.10.
- 3.3.13 By working through the spokes of the Ejection Tool, apply a very light pull force on the bag to prevent any excess bag material from bunching up over the front face of the Support Ring. Rotate the Handwheel clockwise until the Handwheel stops on the aluminum stop on the Handwheel Drive Shaft.
- 3.3.14 At this point, the new Bag Support Ring Sub-Assembly will have been ejected from the Glove Ejection Tool and the Bag Support Ring Sub-Assembly will have expanded out, compressing the O-ring between the bag and the inside of the Enclosure Ring. The ridge of the Support Ring will be seated in the groove on the inside of the Enclosure Ring. The old Glove, Plug, or Bag Assembly will have been pushed into the enclosure.
- 3.3.15 Retract the Inner Housing of the Glove Ejection Tool with a counter-clockwise rotation of the Handwheel and remove the Glove Ejection Tool Assembly from the Enclosure Ring Assembly.

3.4 Installation Procedure for the Safety Cover Assembly

The Oval Safety Cover Assembly is used to secure the Oval Enclosure Ring Assembly during periods when the port is not in use. The Oval Safety Cover Assembly is a metal cover with an O-ring to seal the cover to the Enclosure Ring Assembly. It can be used with an open port or any port that has a Glove, Bag, or Plug Assembly installed in the port.

- 3.4.1 Orientate the Oval Safety Cover Assembly on the Oval Enclosure Assembly.
- 3.4.2 Tighten the four ¼-20 Socket Head Cap Screws finger tight. With an allen wrench tighten the screws an additional turn to seal the Safety Cover to the Enclosure Ring Assembly.

4 MAINTENANCE INSTRUCTIONS

Purging and Ejection Tool Assembly - Maintain a very light coating of lubricant (vacuum grease) on the inside surface of the Swaging Collar (D-37082).

5 OPERATIONAL ACCESSORIES AND SUGGESTED SPARE PARTS

Oval Support Ring Assembly - (1) required for each glove and bag change

Oval Plug Assembly - (1) required for each plug change

Oval Bag Assembly - (1) required for each bag change

Safety Cover Assembly - (1) for each system (optional)

Spare Parts for Purging and Ejection Tool

(2)	X-96175	O-ring ('X' designates O-ring material)
(4)	A-37085	Clamp Screw
(4)	5-93858-0.37	3/8 Retaining Ring
(4)	98051	Spring Plunger

6 PART DESCRIPTION

Oval Enclosure Ring Assembly

Purging and Ejection Tool Assembly

Penetration for Oval Port

Oval Plug Assembly

Oval Support Ring Assembly

Oval Safety Cover Assembly

Oval Bag Assembly

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C	4674	MAT'L WAS SS 303	MLL	04/08/03	PURGING & EJECTION TOOL ASSEMBLY				
B	----	ADDED	MAP	08/31/92					
A	----	ADDED	MAP	06/16/92	APP	CEJ	DATE	06/08/92	ASS'Y NO. C-36534
REV	E.C.O.	WAS	BY	DATE	CKD		DATE		PAGE 1 OF 2
					DR	MAP	DATE	06/08/92	P/L NO. A-36534-1

PART NO. OR DRAWING NO.	DESCRIPTION	QTY. PER ASS'Y.
C-36534	PURGING & EJECTION TOOL	
1-90,009-.37	#5-40 X 3/8 LONG S.H.C.S. (S.STL. 300 SERIES)	12
1-90,016-.37	#10-32 X 3/8 LONG S.H.C.S. (S.STL. 300 SERIES)	5
1-90,016-.50	#10-32 X 1/2 LONG S.H.C.S. (S.STL. 300 SERIES)	8
A 1-90,016-.87	#10-32 X 7/8 LONG S.H.C.S. (S.STL. 300 SERIES)	4
1-90,016-1.25	#10-32 X 1-1/4 LONG S.H.C.S. (S.STL. 300 SERIES)	2
1-90,017-.50	1/4-20 X 1/2 LONG S.H.C.S. (S.STL. 300 SERIES)	4
1-90,017-.75	1/4-20 X 3/4 LONG S.H.C.S. (S.STL. 300 SERIES)	4
B 1-90,017-1.50	1/4-20 X 1-1/2 LONG S.H.C.S. (S.STL. 300 SERIES)	4
1-90,316-.18	#10-32 X 3/16 LONG S.S.S. (S.STL. 300 SERIES)	4
1-93,435-.75	3/16 X 3/4 LONG ROLL PIN (S.STL. 300 SERIES)	1
1-93,435-1.25	3/16 X 1-1/4 LONG ROLL PIN (S.STL. 300 SERIES)	1
1-93,638	#10 FLAT WASHER (S.STL. 300 SERIES)	2
1-93,641	#10 FLAT WASHER (S.STL. 300 SERIES)	3
5-93,858-.37	3/8 RETAINING RING (S.STL. 300 SERIES)	4
C 93.975	NICOPRESS OVAL SLEEVE	1
94,201	BEARING	4
94,449	BEARING	6
2-96,175	O-RING (NEOPRENE)	1
96,357	BEARING (BRONZE)	4
96,396	BEARING (BRONZE)	1
98,012	1/16-27 PIPE PLUG (S.STL. 300 SERIES)	4
98,050	BALL NUT	2
98,051	SPRING PLUNGER (S.STL. 300 SERIES)	4
98,113	LOCKTITE #404 OR EQUAL	A/R
98,119	TRANTORQUE	2

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					Red Wing, Minnesota 55066			
					A DOVER DIVERSIFIED COMPANY			
					PURGING & EJECTION TOOL ASSEMBLY			
C	- - - -	ADDED	MAP	8-31-92	NAME			
B	- - - -	WAS 1.62	MAP	6-13-92	APP. CEJ	DATE 6/8/92	ASS'Y NO. C-36534	
A	- - - -	ADDED	MAP	6-16-92	CK'D.	DATE	PAGE 2 OF 2	
REV.	E.C.O.	WAS	BY	DATE	DR. M.A.P.	DATE 6-8-92	P/L NO. A-36534-2	

**Material Handling Equipment**

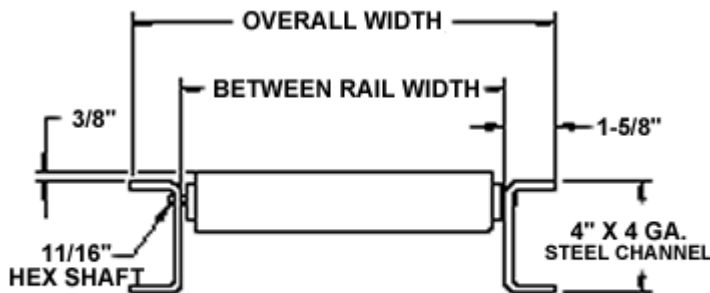
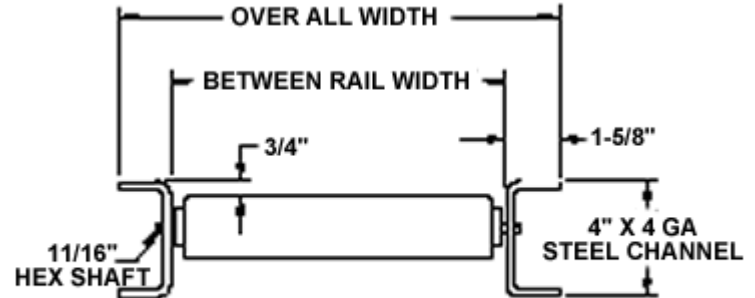
1-800-544-3137

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GRAVITY ROLLER CONVEYOR

2-1/2 IN. DIA. X 11 GA. ROLLERS**2-5/8 IN. DIA. X 7 GA. ROLLERS****SEE BELOW FOR SUPPORTS****STATIONARY
FLOOR
SUPPORT****STOCK ITEMS CODED IN GREEN SHIP IN 24 HRS.****SET HIGH****SET LOW****ORDERING NOTE:** Specify **SET HIGH** (most common) or SET LOW

• Standard Specifications

WIDTHS—Between Rail Width 13 in., 15 in., 17 in., 19 in., 21 in., 23 in., 25 in., 27 in., 31 in., 33 in., 37 in., and 39 in., 43 in., 47 in., 51 in. & 55in.

FRAME—4 in. deep x 1-5/8 in. flange x 4 ga. powder painted formed steel channel with bolt-in cross members set high, welded cross members set low.

BUTT COUPLINGS—For bolting sections together.

ROLLERS—25-SR 2-1/2 in. dia. x 11 ga. steel tubing.
26-SR 2-5/8 in. dia. x 7 ga. unplated steel tubing.
Bearings are labyrinth sealed and grease packed.

AXLES—11/16 in. hex shaft, spring loaded.

CAPACITY—See Load Capacity Chart this page.

LOAD CAPACITY CHART

Support	Frame Capacity (Lbs.) Maximum Distributed	Roller Capacity (Lbs.) Max. Load per Roller	

OPTIONAL EQUIPMENT

FRAME—4 in. x 5.4 lb. powder painted structural steel channel with bolt-in cross members set high, welded cross members

Centers	Live Load Per Foot	13" to 39" BR		43" to 51" BR	
5'	1620	2-1/2"	2-5/8"	2-1/2"	2-5/8"
10'	288	630			

set low.

ORDERING NOTE: Specify SET HIGH (most common) or SET LOW**PRICING FOR 2-1/2" DIA. GRAVITY ROLLER CONVEYOR****2-1/2" DIA. X 11 GA. ROLLER STRAIGHT SECTIONS**

Over All Width	Between Rail Width	Model No. 2.5 x 11 Ga	Roller Centers (inches)	Weights (Lbs.)		Price Per Section	
				5'	10'	5'	10'
16-1/4"	13"	25SR-13-3	3"	185	364	\$325	\$649
16-1/4"	13"	25SR-13-4	4"	155	303	\$260	\$520
16-1/4"	13"	25SR-13-6	6"	125	242	\$195	\$391
16-1/4"	13"	25SR-13-8	8"	113	212	\$163	\$326
16-1/4"	13"	25SR-13-12	12"	95	182	\$131	\$262
18-1/4"	15"	25SR-15-3	3"	200	390	\$340	\$681
18-1/4"	15"	25SR-15-4	4"	170	330	\$272	\$544
18-1/4"	15"	25SR-15-6	6"	135	260	\$204	\$408
18-1/4"	15"	25SR-15-8	8"	120	230	\$170	\$340
18-1/4"	15"	25SR-15-12	12"	105	200	\$136	\$272
20-1/4"	17"	25SR-17-3	3"	215	420	\$356	\$713
20-1/4"	17"	25SR-17-4	4"	180	350	\$284	\$569
20-1/4"	17"	25SR-17-6	6"	145	280	\$212	\$425
20-1/4"	17"	25SR-17-8	8"	125	240	\$177	\$353
20-1/4"	17"	25SR-17-12	12"	105	205	\$141	\$281
22-1/4"	19"	25SR-19-3	3"	234	458	\$372	\$745
22-1/4"	19"	25SR-19-4	4"	192	375	\$297	\$593
22-1/4"	19"	25SR-19-6	6"	151	292	\$221	\$442
22-1/4"	19"	25SR-19-8	8"	134	251	\$183	\$366
22-1/4"	19"	25SR-19-12	12"	110	209	\$145	\$291
24-1/4"	21"	25SR-21-3	3"	245	480	\$388	\$776
24-1/4"	21"	25SR-21-4	4"	200	390	\$309	\$618
24-1/4"	21"	25SR-21-6	6"	160	310	\$230	\$459
24-1/4"	21"	25SR-21-8	8"	135	260	\$190	\$380
24-1/4"	21"	25SR-21-12	12"	115	220	\$150	\$300
26-1/4"	23"	25SR-23-3	3"	260	510	\$404	\$808
26-1/4"	23"	25SR-23-4	4"	210	410	\$321	\$642
26-1/4"	23"	25SR-23-6	6"	165	320	\$238	\$476
26-1/4"	23"	25SR-23-8	8"	140	270	\$197	\$393
26-1/4"	23"	25SR-23-12	12"	120	230	\$155	\$310
28-1/4"	25"	25SR-25-3	3"	282	552	\$420	\$840
28-1/4"	25"	25SR-25-4	4"	230	447	\$333	\$667
28-1/4"	25"	25SR-25-6	6"	177	342	\$247	\$493
28-1/4"	25"	25SR-25-8	8"	156	289	\$203	\$406
28-1/4"	25"	25SR-25-12	12"	124	236	\$160	\$320
30-1/4"	27"	25SR-27-3	3"	285	560	\$436	\$872
30-1/4"	27"	25SR-27-4	4"	235	460	\$345	\$691

30-1/4"	27"	25SR-27-6	6"	180	350	\$255	\$510
30-1/4"	27"	25SR-27-8	8"	150	290	\$210	\$420
30-1/4"	27"	25SR-27-12	12"	125	240	\$165	\$329
34-1/4"	31"	25SR-31-3	3"	331	646	\$468	\$936
34-1/4"	31"	25SR-31-4	4"	267	519	\$370	\$740
34-1/4"	31"	25SR-31-6	6"	203	391	\$272	\$544
34-1/4"	31"	25SR-31-8	8"	178	328	\$223	\$446
34-1/4"	31"	25SR-31-12	12"	139	264	\$174	\$349
36-1/4"	33"	25SR-33-3	3"	330	650	\$484	\$967
36-1/4"	33"	25SR-33-4	4"	265	520	\$382	\$764
36-1/4"	33"	25SR-33-6	6"	200	390	\$281	\$561
36-1/4"	33"	25SR-33-8	8"	165	320	\$230	\$460
36-1/4"	33"	25SR-33-12	12"	135	260	\$179	\$358
40-1/4"	37"	25SR-37-3	3"	355	700	\$515	\$1,031
40-1/4"	37"	25SR-37-4	4"	285	560	\$406	\$813
40-1/4"	37"	25SR-37-6	6"	215	420	\$298	\$595
40-1/4"	37"	25SR-37-8	8"	180	350	\$243	\$487
40-1/4"	37"	25SR-37-12	12"	140	275	\$189	\$378
42-1/4"	39"	25SR-39-3	3"	375	740	\$531	\$1,063
42-1/4"	39"	25SR-39-4	4"	285	580	\$419	\$837
42-1/4"	39"	25SR-39-6	6"	220	430	\$306	\$612
42-1/4"	39"	25SR-39-8	8"	185	360	\$250	\$500
42-1/4"	39"	25SR-39-12	12"	145	280	\$194	\$387
46-1/4"	43"	25SR-43-3	3"	415	820	\$563	\$1,126
46-1/4"	43"	25SR-43-4	4"	305	620	\$443	\$886
46-1/4"	43"	25SR-43-6	6"	225	450	\$323	\$646
46-1/4"	43"	25SR-43-8	8"	195	380	\$263	\$526
46-1/4"	43"	25SR-43-12	12"	155	290	\$203	\$407
50-1/4"	47"	25SR-47-3	3"	455	900	\$595	\$1,190
50-1/4"	47"	25SR-47-4	4"	325	660	\$468	\$935
50-1/4"	47"	25SR-47-6	6"	235	470	\$340	\$680
50-1/4"	47"	25SR-47-8	8"	205	400	\$277	\$553
50-1/4"	47"	25SR-47-12	12"	165	300	\$213	\$426
54-1/4"	51"	25SR-51-3	3"	495	980	\$627	\$1,254
54-1/4"	51"	25SR-51-4	4"	345	700	\$492	\$984
54-1/4"	51"	25SR-51-6	6"	245	490	\$357	\$715
54-1/4"	51"	25SR-51-8	8"	215	420	\$290	\$580
54-1/4"	51"	25SR-51-12	12"	175	310	\$223	\$445
58-1/4"	55"	25SR-55-3	3"	535	1060	\$659	\$1,317
58-1/4"	55"	25SR-55-4	4"	365	740	\$516	\$1,033
58-1/4"	55"	25SR-55-6	6"	255	550	\$374	\$749
58-1/4"	55"	25SR-55-8	8"	225	440	\$303	\$607
58-1/4"	55"	25SR-55-12	12"	185	320	\$232	\$464

PRICING FOR 2-5/8" DIA. X 7 GA. ROLLER STRAIGHT SECTIONS

Over All Width	Between Rail Width	Model No. 2.6 x 11 Ga	Roller Centers (inches)	Weights (Lbs.)		Price Per Section	
				5'	10'	5'	10'

16-1/4"	13"	26SR-13-3	3"	217	427	\$383	\$766
16-1/4"	13"	26SR-13-4	4"	179	351	\$304	\$608
16-1/4"	13"	26SR-13-6	6"	141	274	\$225	\$449
16-1/4"	13"	26SR-13-8	8"	125	236	\$185	\$370
16-1/4"	13"	26SR-13-12	12"	102	198	\$146	\$291
18-1/4"	15"	26SR-15-3	3"	235	465	\$409	\$818
18-1/4"	15"	26SR-15-4	4"	200	390	\$323	\$647
18-1/4"	15"	26SR-15-6	6"	160	305	\$238	\$476
18-1/4"	15"	26SR-15-8	8"	135	250	\$196	\$391
18-1/4"	15"	26SR-15-12	12"	114	210	\$153	\$306
20-1/4"	17"	26SR-17-3	3"	260	515	\$435	\$869
20-1/4"	17"	26SR-17-4	4"	220	430	\$343	\$686
20-1/4"	17"	26SR-17-6	6"	175	330	\$252	\$503
20-1/4"	17"	26SR-17-8	8"	145	265	\$206	\$412
20-1/4"	17"	26SR-17-12	12"	121	220	\$160	\$320
22-1/4"	19"	26SR-19-3	3"	282	553	\$460	\$921
22-1/4"	19"	26SR-19-4	4"	228	446	\$363	\$725
22-1/4"	19"	26SR-19-6	6"	175	340	\$265	\$530
22-1/4"	19"	26SR-19-8	8"	153	286	\$216	\$433
22-1/4"	19"	26SR-19-12	12"	121	233	\$167	\$335
24-1/4"	21"	26SR-21-3	3"	310	620	\$486	\$972
24-1/4"	21"	26SR-21-4	4"	260	510	\$382	\$765
24-1/4"	21"	26SR-21-6	6"	205	380	\$278	\$557
24-1/4"	21"	26SR-21-8	8"	165	295	\$227	\$453
24-1/4"	21"	26SR-21-12	12"	135	240	\$175	\$350
26-1/4"	23"	26SR-23-3	3"	285	562	\$512	\$1,024
26-1/4"	23"	26SR-23-4	4"	230	450	\$402	\$804
26-1/4"	23"	26SR-23-6	6"	178	346	\$292	\$584
26-1/4"	23"	26SR-23-8	8"	150	290	\$237	\$474
26-1/4"	23"	26SR-23-12	12"	127	245	\$182	\$364
28-1/4"	25"	26SR-25-3	3"	346	679	\$538	\$1,075
28-1/4"	25"	26SR-25-4	4"	277	542	\$422	\$843
28-1/4"	25"	26SR-25-6	6"	268	405	\$305	\$611
28-1/4"	25"	26SR-25-8	8"	209	337	\$247	\$495
28-1/4"	25"	26SR-25-12	12"	181	140	\$189	\$379
30-1/4"	27"	26SR-27-3	3"	310	670	\$564	\$1,127
30-1/4"	27"	26SR-24-4	4"	270	530	\$441	\$882
30-1/4"	27"	26SR-27-6	6"	205	400	\$319	\$638
30-1/4"	27"	26SR-27-8	8"	141	330	\$258	\$515
30-1/4"	27"	26SR-27-12	12"	120	271	\$197	\$393
34-1/4"	31"	26SR-31-3	3"	410	805	\$615	\$1,230
34-1/4"	31"	26SR-31-4	4"	326	638	\$480	\$961
34-1/4"	31"	26SR-31-6	6"	243	471	\$346	\$692
34-1/4"	31"	26SR-31-8	8"	209	387	\$278	\$557
34-1/4"	31"	26SR-31-12	12"	159	304	\$211	\$422
36-1/4"	33"	26SR-33-3	3"	390	780	\$641	\$1,282
36-1/4"	33"	26SR-33-4	4"	310	610	\$500	\$1,000
36-1/4"	33"	26SR-33-6	6"	235	460	\$359	\$719

36-1/4"	33"	26SR-33-8	8"	190	370	\$289	\$578
36-1/4"	33"	26SR-33-12	12"	160	290	\$218	\$437
40-1/4"	37"	26SR-37-3	3"	380	752	\$692	\$1,385
40-1/4"	37"	26SR-37-4	4"	305	600	\$539	\$1,078
40-1/4"	37"	26SR-37-6	6"	230	446	\$386	\$772
40-1/4"	37"	26SR-37-8	8"	190	370	\$310	\$619
40-1/4"	37"	26SR-37-12	12"	148	298	\$233	\$466
42-1/4"	39"	26SR-39-3	3"	405	805	\$718	\$1,436
42-1/4"	39"	26SR-39-4	4"	325	640	\$559	\$1,118
42-1/4"	39"	26SR-39-6	6"	245	475	\$400	\$799
42-1/4"	39"	26SR-39-8	8"	200	390	\$320	\$640
42-1/4"	39"	26SR-39-12	12"	156	305	\$240	\$481
46-1/4"	43"	26SR-43-3	3"	455	911	\$770	\$1,539
46-1/4"	43"	26SR-43-4	4"	365	720	\$598	\$1,196
46-1/4"	43"	26SR-43-6	6"	275	533	\$426	\$853
46-1/4"	43"	26SR-43-8	8"	220	430	\$341	\$681
46-1/4"	43"	26SR-43-12	12"	172	333	\$255	\$510
50-1/4"	47"	26SR-47-3	3"	505	1017	\$821	\$1,643
50-1/4"	47"	26SR-47-4	4"	405	800	\$637	\$1,275
50-1/4"	47"	26SR-47-6	6"	305	519	\$453	\$907
50-1/4"	47"	26SR-47-8	8"	240	470	\$361	\$723
50-1/4"	47"	26SR-47-12	12"	188	361	\$270	\$539
54-1/4"	51"	26SR-51-3	3"	555	1123	\$873	\$1,746
54-1/4"	51"	26SR-51-4	4"	445	880	\$677	\$1,353
54-1/4"	51"	26SR-51-6	6"	335	649	\$480	\$961
54-1/4"	51"	26SR-51-8	8"	260	510	\$382	\$764
54-1/4"	51"	26SR-51-12	12"	204	389	\$284	\$568
58-1/4"	55"	26SR-55-3	3"	605	1229	\$924	\$1,849
58-1/4"	55"	26SR-55-4	4"	485	960	\$716	\$1,432
58-1/4"	55"	26SR-55-6	6"	365	779	\$507	\$1,014
58-1/4"	55"	26SR-55-8	8"	280	550	\$403	\$806
58-1/4"	55"	26SR-55-12	12"	220	417	\$299	\$597

PRICING INFORMATION

● STANDARD WIDTHS

All Standard Widths to be offered 1 week from Stockyard, 10 ft. and 5 ft. lengths only.

● STRUCTURAL CHANNEL FRAME

In place of formed channel (On odd lengths, use next whole foot) Set High Only.

4" x 5.4 LB ...add-on per foot both sides.....	\$4.44
5" x 6.7 LB Add-on per foot both sides	\$8.99
6" x 8.2 LB Add-on per foot both sides	\$17.21

● GUARD RAIL

2" x 1-5/8" x 4 ga Fixed Angle "Type A"	
both sides Add-on per foot	\$10.88
one sides Add-on per foot	\$5.44
2" x 1-5/8" x 4 GA Fixed Angle "Type B"	
both sides Add-on per foot	\$10.88

● GALVANIZING

(25SR & 26SR)

Add To Base Price 40%

Galvanized construction (Frame and Rollers Only) all other parts will be HRS construction

Note: Not rated for washdown construction

Note: Contact us for washdown application

● TREAD PLATES

Specify Roller Centers (4", 6", 8" & 12" Only)

13"-25" BREach	\$47.95
27"-39" BREach	\$69.60
43"-55" BREach	\$76.04

● HEAVY DUTY END STOP

6" x 8.2 lbs. structural channel	
13"-43" BR	\$52.95

one sides Add-on per foot

\$5.44

45"-55" BR

\$77.26

IMPORTANT NOTES...● **BUTT COUPLINGS**

Standard straight sections & curves have butt couplings on both ends.

● **SHIPPING INFORMATION**

All 2-1/2" & 2-5/8" dia. roller gravity conveyor sections are shipped with rollers installed in frames when total weight of section is 500 lbs. or less. All sections exceeding this weight will have a portion of rollers removed and crated separately to keep weight under 500 lbs. limit.

● **OTHER WIDTHS**

For "IN-BETWEEN WIDTHS", use next width plus 10%.

For widths up to 74-1/4" OAW, interpolate plus 10%.

For widths over 74-1/4" OAW, contact us.

Does not apply to tapered rollers, contact us.

● **NON-STANDARD WIDTHS**

Require an additional (2) weeks.

PRICING FOR ROLLERS ONLY

Between Rail Width	2-1/2" Dia. G-00472 Price Each	2-5/8" Dia. G-00487 Price Each	Tapered G-01305 Price Each
13"	\$28.40	\$34.60	-
15"	\$30.00	\$37.00	-
17"	\$31.60	\$39.40	-
19"	\$33.40	\$42.20	\$318.60
21"	\$35.00	\$44.40	\$325.20
23"	\$36.80	\$47.00	\$332.20
25"	\$38.40	\$49.40	\$339.40
27"	\$40.00	\$52.00	\$346.60
31"	\$43.40	\$57.20	\$360.60
33"	\$45.00	\$59.20	\$366.80
37"	\$48.40	\$64.80	\$381.00
39"	\$50.20	\$67.00	\$388.00
43"	\$53.40	\$72.00	\$405.80
47"	\$57.00	\$76.80	\$441.80
51"	\$60.00	\$82.40	\$485.20
55"	\$64.80	\$87.00	-

STATIONARY FLOOR SUPPORTS

FOR USE WITH 2-1/2" AND 2-5/8" ROLLER SECTIONS

**PRICES FOR STATIONARY SUPPORTS INCLUDE:**

- Welded Frame Assembly
- Adjustable Feet
- Adjustable Pivot Plate
- HS Capacity: 4000 lbs. ea.

Green Applies Stockyard Center Conveyor Widths Only.

"HS" SUPPORT

Model No.	Adjustment to Top of Roller	Weight (lbs.)	Price ea.
HSL-1	4-3/8" to 4-7/8"	16	\$49.28
HSL-2	4-3/8" to 4-7/8"	16	\$49.28
HSL-3	4-3/8" to 4-7/8"	16	\$49.28
HSL-4	4-7/8" to 6-5/8"	16	\$49.28
HSL-5	6-7/8" to 10-1/2"	16	\$49.28
HS-1	10 1/2" to 12"	16	\$49.28
HS2	12" to 15"	18	\$49.62
HS-3*	15" to 18"	19-1/2	\$51.28
HS-4*	18" to 21"	27	\$52.84
HS-5*	21" to 24"	28-1/2	\$54.72

IMPORTANT NOTES...● **WHEN ORDERING SUPPORTS**

Specify Overall Conveyor Width.

HS-6*	24" to 30"	31-1/2	\$67.16
HS-7*	30" to 36"	35	\$73.82
HS-8*	36" to 48"	43	\$85.36
HS-9*	48" to 60"	49-1/2	\$95.57
HS-10*	60" to 72"	56	\$104.45
HS 11*	72" to 84"	62	\$110.89
HS-12*	84" to 96"	68	\$123.99
HS-13*	90" to 102"	74	\$169.61
HS-14*	102" to 114"	80	\$179.49
HS-15*	114" to 126"	86	\$185.59
HS 16*	126" to 138"	92	\$208.24
HS-17*	138" to 150"	98	\$227.11
HS 18*	150" to 162"	104	\$237.54
HS-19*	162" to 174"	110	\$243.09

*Price includes Knee Braces

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Technical drawings and 3-D models
available for items with this symbol.

Surface-Mount Piano Hinges

For information about hinges, see page 2930.



Don't see the piano hinge you need? Just tell us what you're looking for and we'll get it for you.

Unfinished Steel Piano Hinges without Holes (Continued from previous page)



Open Wd.	Pin Dia.	Knuckle Lg.	3-ft. Length Each★	4-ft. Length Each★	5-ft. Length Each★	6-ft. Length Each★	8-ft. Length Each★
0.072" Thick Leaf							
1 1/2"	1/4"	1"	15665A147 \$6.54	15665A321 \$8.05	15665A322 \$9.22	15665A323 \$10.06	15665A161 \$14.76
2"	1/4"	1"	15665A152 7.87	15665A336 9.69	15665A337 11.10	15665A338 12.11	15665A341 17.77
2 1/2"	1/4"	1"	15665A153 9.47	15665A351 11.66	15665A352 13.36	15665A353 14.57	15665A355 21.37
3"	1/4"	1"	15665A154 10.60	15665A365 13.05	15665A366 14.96	15665A367 16.31	15665A369 23.93
3 1/2"	1/4"	1"	15665A155 11.72	15665A373 14.42	15665A158 16.53	15665A375 18.03	15665A377 26.45
4"	1/4"	1"	15665A157 13.38	15665A189 16.47	15665A159 18.88	15665A389 20.59	15665A392 30.21
0.075" Thick Leaf							
1 1/2"	3/16"	1"	15665A57 5.55	15665A63 6.83	15665A68 7.83	15665A315 8.54	15665A75 12.53
2"	3/16"	1"	15665A58 6.50	15665A64 8.00	15665A69 9.17	15665A328 10.00	15665A328 14.67
2 1/2"	3/16"	1"	15665A59 7.47	15665A65 9.19	15665A71 10.54	15665A346 11.49	15665A76 16.86
3"	3/16"	1"	15665A61 9.18	15665A66 11.30	15665A72 12.96	15665A361 14.13	15665A362 20.73
4"	3/16"	1"	15665A62 10.53	15665A67 12.96	15665A73 14.86	15665A74 16.20	15665A384 23.77
0.090" Thick Leaf							
2"	1/4"	1"	15665A422 10.26	15665A79 12.62	15665A84 14.47	15665A425 15.78	15665A427 23.15
3"	1/4"	1"	15665A429 12.93	15665A81 15.91	15665A85 18.24	15665A433 19.89	15665A434 29.18
4"	1/4"	1"	15665A77 15.07	15665A82 18.54	15665A86 21.26	15665A439 23.18	15665A442 34.01
5"	1/4"	1"	15665A78 20.27	15665A83 24.95	15665A87 28.60	15665A447 31.19	15665A88 45.76

★ Prices are 15% to 20% lower if you buy 10 or more hinges of the same size.

Open Wd.	Pin Dia.	Knuckle Lg.	1-ft. Length Each◆	2-ft. Length Each◆	4-ft. Length Each◆	6-ft. Length Each◆	8-ft. Length Each◆
0.120" Thick Leaf							
2"	1/4"	2"	15665A89 \$6.07	15665A99 \$11.71	15665A109 \$20.82	15665A525 \$26.03	15665A527 \$38.19
2"	3/8"	2"	15665A91 6.52	15665A101 12.60	15665A111 22.40	15665A532 28.00	15665A534 41.08
2 1/2"	3/8"	2"	15665A92 6.79	15665A102 13.11	15665A116 23.30	15665A539 29.13	15665A541 42.73
3"	1/4"	2"	15665A93 7.79	15665A103 15.05	15665A803 26.76	15665A548 33.45	15665A551 49.07
3"	3/8"	2"	15665A94 8.80	15665A552 16.99	15665A554 30.21	15665A556 37.76	15665A558 55.39
3 1/2"	1/2"	2"	15665A169 10.48	15665A173 20.24	15665A177 35.98	15665A179 44.97	15665A564 65.97
3 1/2"	3/8"	2"	15665A95 9.62	15665A107 18.58	15665A122 33.02	15665A569 41.28	15665A572 60.56
4"	3/8"	2"	15665A96 7.26	15665A106 14.03	15665A124 24.94	15665A577 31.17	15665A579 45.73
5"	3/8"	2"	15665A97 11.55	15665A214 22.31	15665A583 39.66	15665A585 49.57	15665A587 72.72
6"	3/8"	2"	15665A98 12.62	15665A108 24.37	15665A125 43.32	15665A595 54.15	15665A597 79.44
0.180" Thick Leaf							
3"	1/2"	2"	15665A126 18.90	15665A631 36.51	15665A633 64.90	15665A635 81.13	15665A637 119.02
4"	1/2"	2"	15665A127 20.08	15665A132 38.77	15665A641 68.93	15665A643 86.16	15665A645 126.40
5"	1/2"	2"	15665A129 21.42	15665A133 41.38	15665A648 73.56	15665A651 91.95	15665A653 134.89
6"	1/2"	2"	15665A131 22.52	15665A137 43.49	15665A138 77.32	15665A139 96.65	15665A661 141.79
0.250" Thick Leaf							
3"	5/8"	1 1/2"	15665A184 35.16	15665A801 67.91	15665A191 120.72	15665A735 150.90	15665A737 221.37
4"	5/8"	1 1/2"	15665A192 37.04	15665A193 71.54	15665A194 127.18	15665A743 158.97	15665A745 233.21
5"	5/8"	1 1/2"	15665A195 38.82	15665A196 74.97	15665A197 133.29	15665A751 166.61	15665A753 244.42

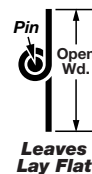
◆ Prices are 15% to 20% lower if you buy five or more hinges of the same size.

Unfinished Steel Piano Hinges with Brass Pins and without Holes



Similar to our Unfinished Steel Piano Hinges without Holes, but with brass pins that resist corrosion and wear better over time than steel pins. You choose how to surface mount these hinges—they don't have mounting holes. Spot weld them in place or drill holes for rivets or screws. Hinges can be cut with a hacksaw. From the folded position, the range of motion is 270°.

Open Wd.	Pin Dia.	Knuckle Lg.	6-ft. Length Each
0.025" Thick Leaf			
3/4"	1/16"	1/4"	11815A12 \$3.38
1"	1/16"	1/4"	11815A17 5.08
0.040" Thick Leaf			
1 1/2"	3/32"	1/2"	11815A43 8.54
2"	3/32"	1/2"	11815A44 10.66
0.060" Thick Leaf			
1 1/2"	1/8"	1/2"	11815A52 10.32
2"	1/8"	1/2"	11815A53 11.85
3"	1/8"	1/2"	11815A55 14.74

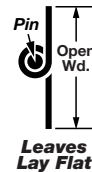


Electrogalvanized Steel Piano Hinges without Holes



Electrogalvanizing gives these hinges the necessary corrosion resistance for use in heating, ventilating, air-conditioning, and other sheet-metal applications. Pin and leaves are both galvanized, so you can either paint hinges or use them without additional finishing. Designed for surface-mount applications, these hinges don't have mounting holes. Spot weld them in place or drill holes for rivets or screws. Hinges can be cut with a hacksaw. From the folded position, the range of motion is 270°.

Open Wd.	Pin Dia.	Knuckle Lg.	6-ft. Length Each
0.042" Thick Leaf			
1 1/2"	3/32"	1/2"	12145A71 \$7.07
2"	3/32"	1/2"	12145A72 10.35
0.062" Thick Leaf			
1 1/2"	1/8"	1/2"	12145A81 10.65
2"	1/8"	1/2"	12145A82 11.80
3"	1/8"	1/2"	12145A83 13.04

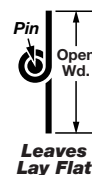


Brass Piano Hinges without Holes



Made entirely of brass, these hinges perform extremely well in corrosive conditions. They don't have mounting holes, so you can choose how to surface mount them. Spot weld them in place or drill holes for rivets or screws. Hinges can be cut with a hacksaw. From the folded position, the range of motion is 270°.

Open Wd.	Pin Dia.	Knuckle Lg.	1-ft. Length Each	3-ft. Length Each	6-ft. Length Each
0.040" Thick Leaf					
1 1/16"	7/64"	1/2"	1578A2 \$8.85	1578A8 \$24.69	1578A17 \$37.98
1 1/4"	7/64"	1/2"	1578A3 8.98	1578A9 25.06	1578A19 38.56
1 1/2"	7/64"	1/2"	1578A4 9.70	1578A11 27.05	1578A33 41.62
2"	7/64"	1/2"	1578A5 12.79	1578A13 35.69	1578A32 54.91
0.060" Thick Leaf					
2"	1/8"	1/2"	1578A6 18.28	1578A14 50.99	1578A41 78.44



Pull Handles

For information about pull handles, see page 2924.

Pull Handles with Threaded Holes (Continued from previous page)

Oval Grip (Continued)

(A)	Proj.	Grip Size, Ht. x Wd.	Thread Size	Depth	Each
Cast Type 304 Stainless Steel—Dull Finish					
6	2 3/4"	1 3/16" x 1 3/32"	8-32	1/2"	1786A15★ \$23.47
Cast Aluminum—Dull Anodized Finish					
7	5 1/2"	2 1/4" x 3/32" x 3/4"	1/4"-20	3/4"	1402A19 13.67
7	7 1/2"	2 3/8" x 4/64" x 3/4"	1/4"-20	3/4"	1402A24 19.82

★ Mounting screws not included.

Rectangular Grip—Styles 10-12

(A)	Proj.	Grip Size, Ht. x Wd.	Thread Size	Depth	Each
Extruded Aluminum—Dull Finish					
10	2"	1 1/2" x 1/2" x 1/4"	8-32	7/16"	15145A31 \$6.94
10	4"	1 1/2" x 1/2" x 1/4"	8-32	7/16"	15145A41 7.29
10	4 3/16"	1 1/2" x 1/2" x 1/4"	8-32	7/16"	15145A51 7.43
10	6"	1 1/2" x 1/2" x 1/4"	8-32	7/16"	15145A61 7.66
Extruded Aluminum—Black Anodized Finish					
10	2"	1 1/2" x 1/2" x 1/4"	8-32	7/16"	15145A33 6.94
10	4"	1 1/2" x 1/2" x 1/4"	8-32	7/16"	15145A43 7.29
10	4 3/16"	1 1/2" x 1/2" x 1/4"	8-32	7/16"	15145A53 7.43
10	6"	1 1/2" x 1/2" x 1/4"	8-32	7/16"	15145A63 7.66
Extruded Type 303 Stainless Steel—Polished Finish					
10	6 3/64"	2 3/32" x 2 3/64" x 3/16"	M3	8 mm	1855A58 7.29
10	1 25/32"	5 5/64" x 3/16"	M3	10 mm	1855A59 8.14
10	2 9/16"	5 7/64" x 2 3/64" x 3/16"	M3	10 mm	1855A61 8.57

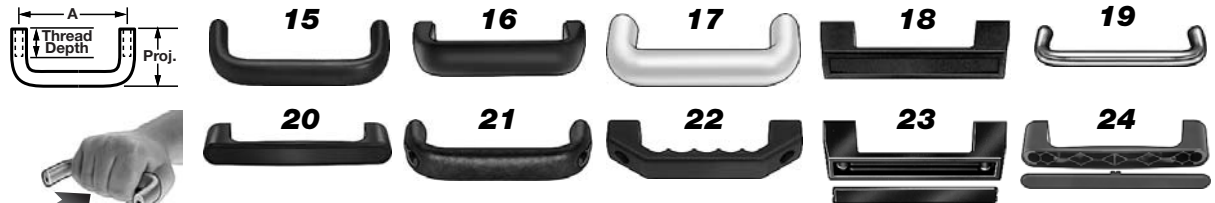
(A)	Proj.	Grip Size, Ht. x Wd.	Thread Size	Depth	Each
Nylon—Black (Max. temp. is 215° F; min. temp. is not rated)					
8	4"	1 1/16" x 5/8" x 3/16"	10-24	27/64"	1815A52★ \$2.27
Nylon—Black (−40° to +320° F)					
9	3 15/32"	1 9/16" x 1 5/32" x 2 3/64"	M5	7.5 mm	1967A1★ 4.82
9	3 15/16"	1 9/16" x 1 5/32" x 2 3/64"	M5	7.5 mm	1967A2★ 4.90
9	4 23/32"	1 9/16" x 1 5/32" x 2 3/64"	M5	7.5 mm	1967A3★ 5.02

Pull Handles with Threaded Studs and Round Grip

(A)	Proj.	Grip Size, dia.	Thread Length	Each
Extruded Aluminum—Black Anodized Finish				
13	4 1/4"	1 3/16" x 5/16"	5/16"-18 1 5/16"	11665A11 \$10.40
13	6"	1 3/16" x 5/16"	5/16"-18 1 5/16"	11665A12 11.52
Extruded Brass—Polished Nickel Finish				
13	4 1/4"	1 3/16" x 5/16"	5/16"-18 1 5/16"	11665A21 11.03
13	6"	1 3/16" x 5/16"	5/16"-18 1 5/16"	11665A22 12.17
Extruded Type 303 Stainless Steel—Dull Finish				
13	4 1/4"	1 3/16" x 5/16"	5/16"-18 1 5/16"	11665A31 14.40
13	6"	1 3/16" x 5/16"	5/16"-18 1 5/16"	11665A32 15.23
Extruded Type 303 Stainless Steel—Polished Finish				
13	4"	1 3/16" x 3/8"	3/8"-24 1 5/16"	11665A4 15.00
13	5"	1 3/16" x 5/16"	5/16"-18 1 5/16"	11665A3 15.63

(A)	Proj.	Grip Size, dia.	Thread Length	Each
Extruded Aluminum—Black Anodized Finish				
14	4"	2 1/4" x 5/16"	1/4"-20 1/2"	11665A6 \$10.97
Extruded Type 303 Stainless Steel—Polished Finish				
14	5"	2 1/4" x 5/16"	1/4"-20 1/2"	11665A7 16.06
Formed 18-8 Stainless Steel—Dull Finish				
14	3 13/16"	1 5/16" x 5/16"	M3 47 mm	11665A35 8.15

Load-Rated Pull Handles



Force Pulling Straight Out from the Handle

Handles are load rated for heavy duty applications. Mounting screws are not included, unless noted. Load capacity stated is for force pulling straight out from the handle (parallel to mounting screws, as shown). **Style 19** handles are for weld-on applications. **Style 23** and **Style 24** handles have a snap-on cover to conceal screws.

(A)	Proj.	Grip Size, Ht. x Wd.	Load Cap., lbs.	Screw Size	Thread Depth	Each
Oval Grip with Threaded Holes						
Aluminum—Black Powder-Coated Finish						
15	3 15/16"	1 55/64" x 5/16" x 33/64"	899	M6	10 mm	5190A8 \$11.64
15	4 13/32"	1 15/16" x 5/16" x 33/64"	843	1/4"-20	25/64"	5190A16 12.68
15	4 13/32"	2 29/32" x 1 1/64" x 43/64"	1349	M8	12 mm	5190A9 14.34
15	5 3/64"	2 11/64" x 1 1/64" x 43/64"	1237	5/16"-18	1 5/32"	5190A17 15.88
15	6 5/16"	2 1/4" x 1 1/64" x 43/64"	1124	5/16"-18	1 5/32"	5190A18 16.98
15	7 9/16"	2 1/4" x 1 1/64" x 43/64"	899	5/16"-18	1 5/32"	5190A19 20.74
15	11 13/16"	2 15/64" x 1 1/64" x 43/64"	337	M8	12 mm	5190A14 26.16
15	15 3/4"	2 15/64" x 1 1/64" x 43/64"	180	M8	12 mm	5190A15 31.64
Type 304 Stainless Steel—Dull Finish						
15	4 13/32"	1 15/16" x 2 25/32" x 1/2"	1124	M6	10 mm	5191A1 33.94
15	5 1/32"	2 1/64" x 2 25/32" x 1/2"	1124	M6	10 mm	5191A2 36.24
Nylon—Black (−22° to +230° F)						
16	4 1/8"	1 129/64" x 1 5/16" x 5/16"	484	1/4"-20	23/64"	1661A1 4.74
16	4 39/64"	1 19/16" x 5/16" x 5/16"	506	5/16"-18	23/64"	1661A2 5.38
Thermoplastic with Type 303 SS Inserts—White (−22° to +248° F)						
17	4 39/64"	2 23/32" x 1 3/16" x 5 1/64"	1121	M8	33/64"	4529A1 15.74
17	7 9/64"	2 1/16" x 1 3/16" x 5 1/64"	538	M8	33/64"	4529A2 21.38

Rectangular Grip with Threaded Holes

ABS Thermoplastic—Black (−40° to +140° F)						
18	4 3/8"	1 9/8" x 1 1/16" x 1 1/32"	125	M6	16 mm	1661A39 5.48

• Mounting screws are included. ♦ Furnished with thread-cutting screws.

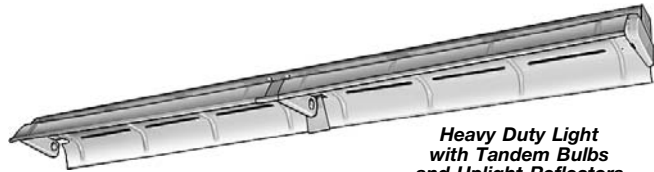
(A)	Proj.	Grip Size, Ht. x Wd.	Load Cap., lbs.	Screw Size	Each
Weld-On Round Grip					
300 Series Stainless Steel—Dull Finish					
19	4 39/64"	2 1/64" x 1 5/32" Dia.	428		7088A1 \$13.68
19	6 5/16"	2 1/64" x 1 5/32" Dia.	428		7088A2 14.92
19	7 7/8"	2 1/64" x 1 5/32" Dia.	428		7088A3 16.20
Rectangular Grip with Unthreaded Holes					
ABS Thermoplastic—Black (−40° to +140° F)					
20	6 3/4"	2" x 1 1/16" x 5/8"	175	M7.5	12375A61 ♦ 6.64
Oval Grip with Unthreaded Through Holes					
Aluminum—Black Powder-Coated Finish					
21	4 9/16"	2 3/32" x 1 1/64" x 43/64"	1349	1/4"	5190A21 16.08
21	5 1/64"	2 11/64" x 1 1/64" x 43/64"	1012	1/4"	5190A22 16.50
21	6 19/32"	2 19/64" x 1 1/64" x 43/64"	787	1/4"	5190A23 17.88
21	7 23/32"	2 19/64" x 1 1/64" x 43/64"	618	1/4"	5190A24 19.22
Rectangular Grip with Unthreaded Through Holes					
Nylon—Black (−20° to +200° F)					
22	3 15/16"	1 19/64" x 43/64" x 2 1/64"	225	M5	5193A1 9.04
22	4 23/32"	1 17/32" x 1 3/16" x 1 9/32"	225	M6	5193A2 10.84
22	5 3/64"	1 49/64" x 1 5/16" x 1 5/32"	225	M8	5193A3 13.98
22	6 19/64"	2 25/64" x 1 5/64" x 1 7/32"	225	M8	5193A4 19.68
22	7 3/32"	2 29/32" x 1 1/32" x 3 39/64"	225	M10	5193A5 28.42
ABS Thermoplastic—Black (−40° to +140° F)					
23	4 3/8"	1 5/8" x 1 1/16" x 1 1/32"	125	#10	12375A71 4.60
24	6 3/4"	2" x 1 1/16" x 5/8"	175	#10	12375A63 6.07

Fluorescent Lights

Exposed-Bulb Fluorescent Lights with Reflector



General Purpose Light
with Solid-Top Reflector



Heavy Duty Light
with Tandem Bulbs
and Uplight Reflectors

By locating the ballast and all electrical hardware in the top portion of the light, the parabolic-shaped steel reflector allows for maximum light output and simple bulb changes. Sometimes referred to as turret lights, these industrial lights have a white finish inside and out, are surface mounted, and have knockouts for hardwire connections and mounting. UL listed.

Heavy Duty Lights—Have die-embossed reflectors for extra strength, reflector end caps, and pressure lock bulb holders.

Lights with solid-top reflectors reflect all light downwards. **Lights with uplight reflectors** have openings that allow 5–10% of light to escape upwards, providing more ambient light and reducing glare.

To Order: Please specify 120 VAC or 277 VAC, unless noted.

Bulbs are sold separately. They have a medium bi-pin base (unless noted) and a color temperature of 4100 Kelvins (cool, white light). For other bulb options, see pages 669–670.

O'all Size, Lg. x Wd. x Ht.	Ballast Type	Min. Start Temp.	Lights with Solid-Top Reflectors		Lights with Uplight Reflectors		Bulbs				
			Each	Each	Each	Each	No. Req'd.	Watts per Bulb	Pkg. Qty.	Per Pkg.	
General Purpose Lights											
With Magnetic Ballast for T12 (1½" Dia.) Bulbs											
96" x 12" x 4½" High Output		-20° F	16235K13■	\$120.92	1613K53■	\$112.29	2	110	6	1504K19	\$56.42
With Electronic Ballast for T8 (1" Dia.) Bulbs											
48" x 12" x 4" Rapid Start		0° F	16235K61●	77.54	1613K67●	67.57	2	32	6	1683K14	24.61
96" x 12" x 4" Instant Start		0° F	16235K64★	103.66	1613K64★	113.70	2	59	6	8355K85	65.63
With Electronic Ballast for T8 (1" Dia.) Bulbs											
48" x 12" x 4" Instant Start		0° F	16235K62●	77.42	1613K46●	54.30	2	32	6	1683K14	24.61
General Purpose Lights with Tandem Bulbs (two bulbs mounted end-to-end)											
With Electronic Ballast for T8 (1" Dia.) Bulbs											
96" x 12" x 4" Instant Start		0° F	16235K59●	115.53	1613K62●	115.53	4	32	6	1683K14	24.61
Heavy Duty Lights											
With Magnetic Ballast for T12 (1½" Dia.) Bulbs											
96" x 13⅝" x 6⅞" High Output		-20° F	8338K63■	144.61	8338K71■	174.32	2	110	15	1504K85	122.40
96" x 13⅝" x 6⅞" Very High Output		-20° F	8338K64■	218.06	8338K72■	216.38	2	215	6	1504K95	81.71
With Electronic Ballast for T12 (1½" Dia.) Bulbs											
49⅓" x 13⅝" x 6⅞" Rapid Start		50° F	8338K75	103.67	8338K85	102.08	2	40	6	1683K41	24.56
96" x 13⅝" x 6⅞" Rapid Start		50° F			8338K88★	159.30	2	75	6	8355K45	77.53
96" x 13⅝" x 6⅞" Instant Start		50° F	8338K65★	142.18			2	60	15	8355K31	63.00
With Electronic Ballast for T8 (1" Dia.) Bulbs											
49⅓" x 13⅝" x 6⅞" Instant Start		0° F	8338K22●	84.25	8338K57●	84.25	2	32	6	1683K14	24.61
Heavy Duty Lights with Tandem Bulbs (two bulbs mounted end-to-end)											
With Electronic Ballast for T12 (1½" Dia.) Bulbs											
99⅓" x 13⅝" x 6⅞" Rapid Start		50° F	8338K92	199.74	8338K96♥	198.38	4	40	6	1683K41	24.56
■ Uses bulbs with recessed double-contact (DC) base. ● Has a universal ballast for both 120 VAC and 277 VAC. ★ Uses bulbs with single-pin base. ♥ Available in 120 VAC only.											

Plug-In Exposed-Bulb Fluorescent Lights with Reflector



Our durable industrial-grade lights offer the convenience of a shop light—simply plug into a 120 VAC outlet for quick illumination. Lights are steel with a white finish. UL listed.

Light **with magnetic preheat ballast for T12 (1½" dia.) bulbs** comes with two 9" hanging chains, a pull switch, and a 12" long cord with a three-prong plug. Light **with electronic ballast for T12 (1½" dia.) bulbs** comes with a 10-ft. long cord with a three-prong plug. Light **with electronic ballast for T8 (1" dia.) bulbs** comes with a 12" long cord with a three-prong plug.

Bulbs are sold separately. They have a medium bi-pin base (unless noted) and a color temperature of 4100 Kelvins (cool, white light). For other bulb options, see pages 669–670.

O'all Size, Lg. x Wd. x Ht.	Ballast Type	Min. Start Temp.	Lights		Bulbs				
			Each		No. Req'd.	Watts per Bulb	Pkg. Qty.	Per Pkg.	
With Magnetic Ballast for T12 (1½" Dia.) Bulbs									
24" x 6½" x 319/32"	Preheat	50° F	1602K4	\$32.02	2	20	6	1501K24	\$21.60
With Electronic Ballast for T12 (1½" Dia.) Bulbs									
96" x 11¼" x 5½"	High Output	-20° F	1602K23	104.41	2	110	6	1504K18	44.52
With Electronic Ballast for T8 (1" Dia.) Bulbs									
48" x 11¼" x 4"	Rapid Start	0° F	1602K7	51.66	2	32	6	1683K14	24.61
■ Uses bulbs with recessed double-contact (DC) base.									

Wall-Mount Fluorescent Lights



These attractive chrome-plated steel lights have a three-sided white acrylic lens for excellent illumination up, down, and outward. They also have an on/off switch and 120 VAC rated outlet (for three-prong plug) on the right side, and knockouts for hardwire connections. Lights operate on 120 VAC. UL listed.

Bulbs (sold separately) have a medium bi-pin base and a color temperature of 4100 Kelvins (cool, white light). For other bulb options, see pages 669–670.

O'all Size, Lg. x Ht. x Dp.	Ballast Type	Min. Start Temp.	Lights		Replacement Lens	Each	Bulbs				
				Each			No. Req'd.	Watts per Bulb	Pkg. Qty.	Per Pkg.	
With Magnetic Ballast for T12 (1½" Dia.) Bulbs											
24⅞" x 2⅞" x 4¼"	Rapid Start	32° F.	1634K34	\$42.72	1634K51	\$4.92	1	20	6	1501K24	\$21.60
36⅞" x 2⅞" x 4¼"	Rapid Start	32° F.	1634K35	55.45	1634K53	5.61	1	30	6	1501K71	38.87
With Electronic Ballast for T8 (1" Dia.) Bulbs											
48⅞" x 2⅞" x 4¼"	Rapid Start	0° F.	1634K36	66.08	1634K54	6.84	1	32	6	1683K14	24.61
48⅞" x 3¼" x 5⅞"	Rapid Start	0° F.	1634K37	75.56	1634K45	19.60	1	32	6	1683K14	24.61

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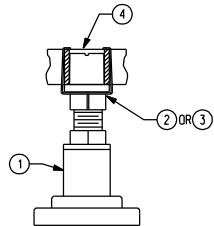
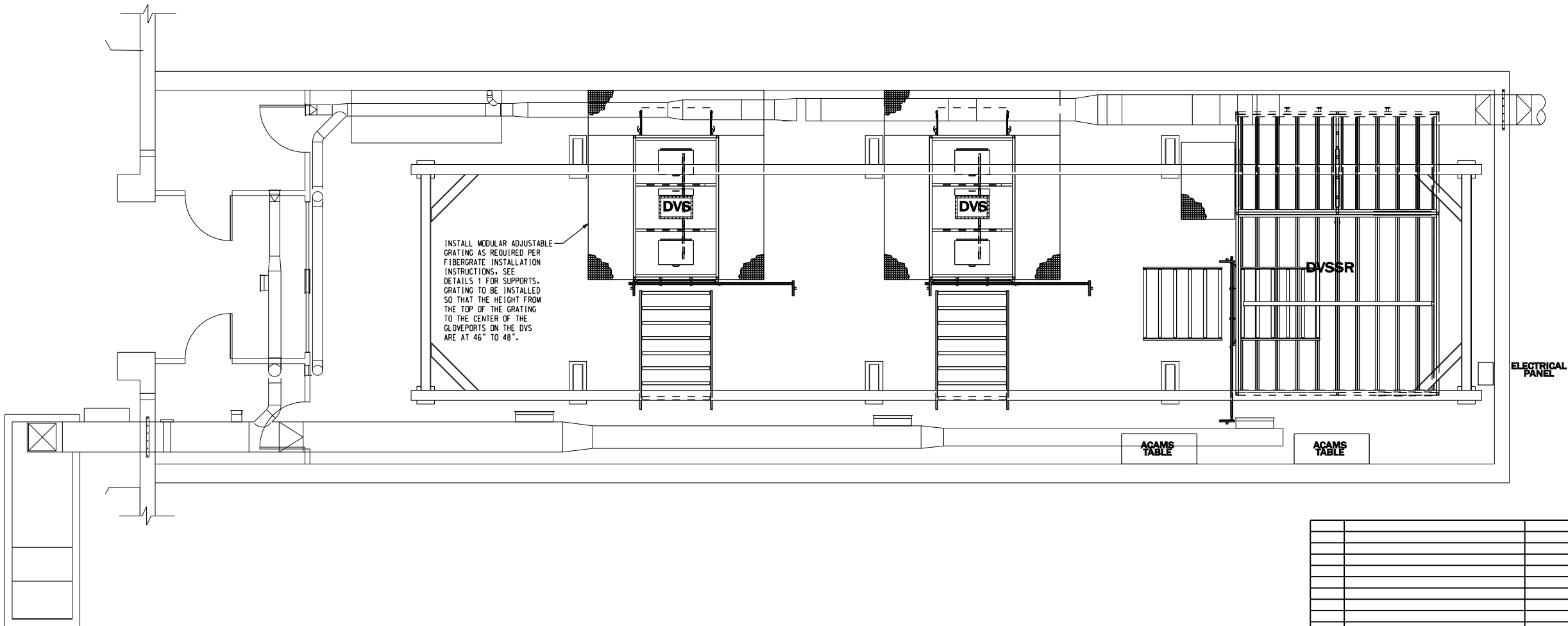
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2 UNCONTROLLED COPY - UNLESS STAMPED OTHERWISE BY DCC¹


Drawing Status									
NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK.	INSP.	PROD.	IE	PROD.	D.L.O.C.
0A	06/30/08	ISSUED PER EWO 379604 & ECP 4554	SDN						

REFERENCE DRAWINGS:
EG-22-M-8220 OFF SITE AREA 10 SECONDARY WASTE SAMPLING DVSSR GENERAL ASSEMBLY
EG-22-M-8230 OFF SITE AREA 10 SECONDARY WASTE SAMPLING DVS GENERAL ASSEMBLY



DETAIL 1

				14
				13
				12
				11
				10
				9
				8
				7
				6
				5
AS REQ'D	4'x4'	GRATES 1.5" SQUARE AND 1.5" THK.	FIBERGRATE	4
AS REQ'D	QUAD HEADED GRATE PLUGS, 1 1/2"	FIBERGRATE		3
AS REQ'D	SINGLE HEADED GRATE PLUGS, 1 1/2"	FIBERGRATE		2
AS REQ'D	8"-11 1/2" ADJUSTABLE HEIGHT LEG	FIBERGRATE		1
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	ITEM
Bill of Material				

0A	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approved
Revisions			
DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND		US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA	
 EG&G A Division of URS		TOOELE ARMY DEPOT TOOELE, UTAH CHEMICAL STOCKPILE DISPOSAL PROGRAM OFF SITE	
Drawn by: SD NICHOLS Date: 06/30/08		Area 10 - SECONDARY WASTE SAMPLING (SWS) 1GLOO 1632 GENERAL ARRANGEMENT PLAN	
Checked by: EG&G Approved:	Scale:	Sheet reference number:	EG&G Contract No. DACAB7-89-C-0076
Engineer: PMCD Mgr. Concur: N/A	NO SCALE	EG-22-G-8219	Sheet 1 of 1 Rev. 0A

NOT FOR CONSTRUCTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = ±.1
.XX = ±.06
.XXX = ±.015
ANGLES = 30°-30°

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4

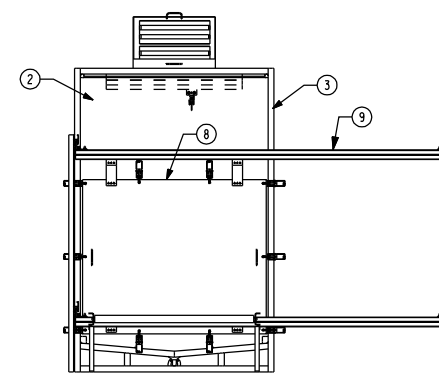
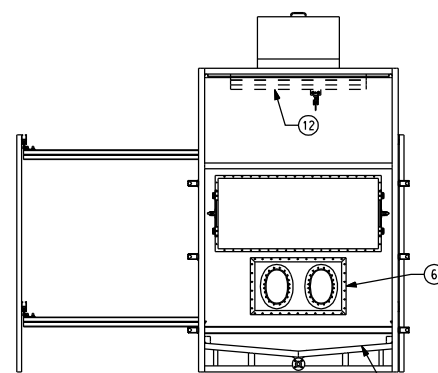
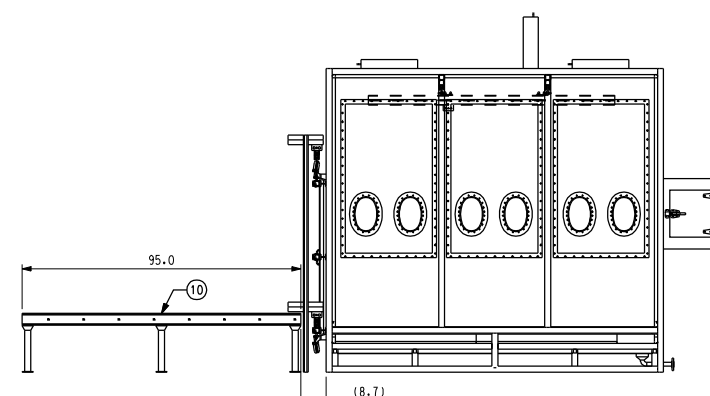
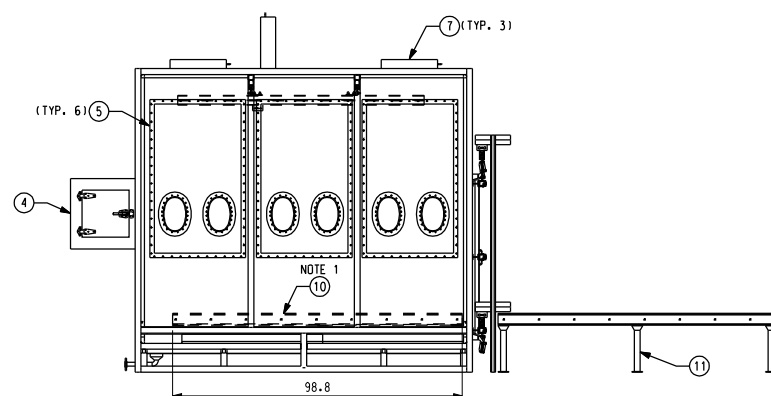
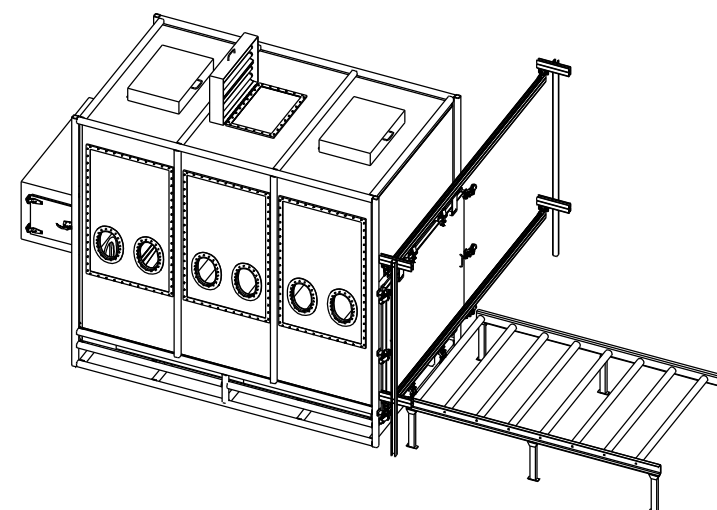
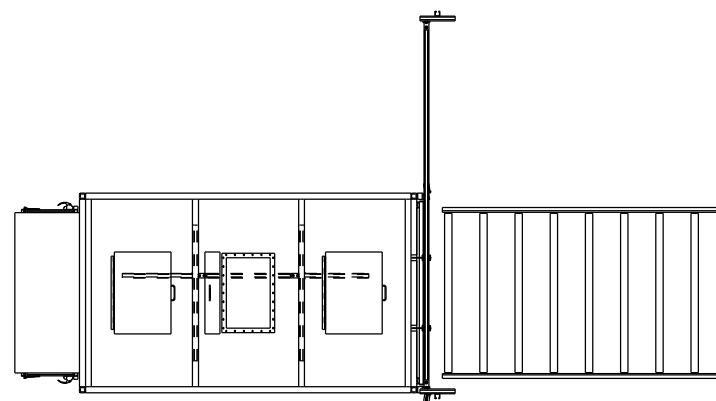
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[illegible]

NOTES:

1. SHIM CONVEYOR 3/4" AND SPOT WELD CONVEYOR TO INTERIOR FRAME WELDMENT.
SEE EG-22-M-8233 FOR INTERIOR FRAME.
2. ALL INTERIOR SURFACE TO BE PAINTED WITH EPOLOID PER SPEC 09900.



NOT FOR CONSTRUCTION

1	LIFTING TROLLEY ASSEMBLY		EG-22-M-8241
3	CONVEYOR SUPPORTS, FOR 55", 18" TO 21"	GILMORE-KRAMER	HS-4
2	CONVEYOR SET LOG: 1 1/2" DIA. x 11 GA. ROLLER, 12" O.C. 10' LONG	GILMORE-KRAMER	25SR-55-12
1	DOOR TROLLEY ASSEMBLY	EG-22-M-8240	
1	DOOR ASSEMBLY	EG-22-M-8239	
3	LIGHT/WINDOW ASSEMBLY	FG-22-M-8238	
1	DRAIN GLOVE PORT/WINDOW ASSEMBLY	EG-22-M-8237	
6	MAIN GLOVE PORT/WINDOW ASSEMBLY	EG-22-M-8236	
1	AIRLOCK ASSEMBLY	EG-22-M-8235	
1	FRAME ASSEMBLY	EG-22-M-8234	
1	ENCLOSURE ASSEMBLY	EG-22-M-8232/8233	
2	DRAIN PAN ASSEMBLY	EG-22-M-8231	
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER

[illegible]

OA	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approval
	Revisions		

DEPARTMENT OF THE ARMY
PROGRAM MANAGER FOR
CHEMICAL DEMILITARIZATION
ABERDEEN PROVING GROUND, MARYLAND

US ARMY ENGINEER DISTRICT SACRAMENTO
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA



EG&G
A Division of ITT

 US Army Corps of Engineers

CHEMICAL STOCKPILE DISPOSAL PROGRAM
OFF SITE
AREA 10 - SECONDARY WASTE SAMPLING (SWS)
DVS - GENERAL ASSEMBLY

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X $\pm .1$
.XX $\pm .06$
.XXX $\pm .015$
ANGLES $\pm 0^{\circ}-30'$

Drawn by:	Date:
SD NICHOLAS	06/30/0
Checked by:	EG&G Ap
Engineer:	PMCD Mgr

Approved:	Scale:
Concur:	NO S

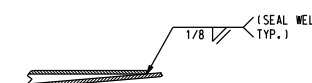
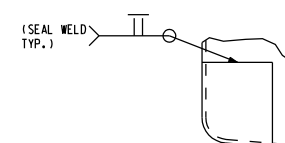
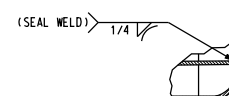
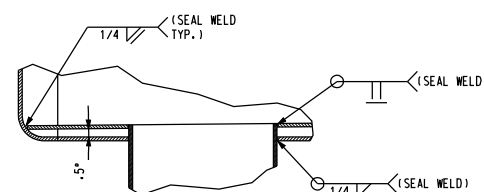
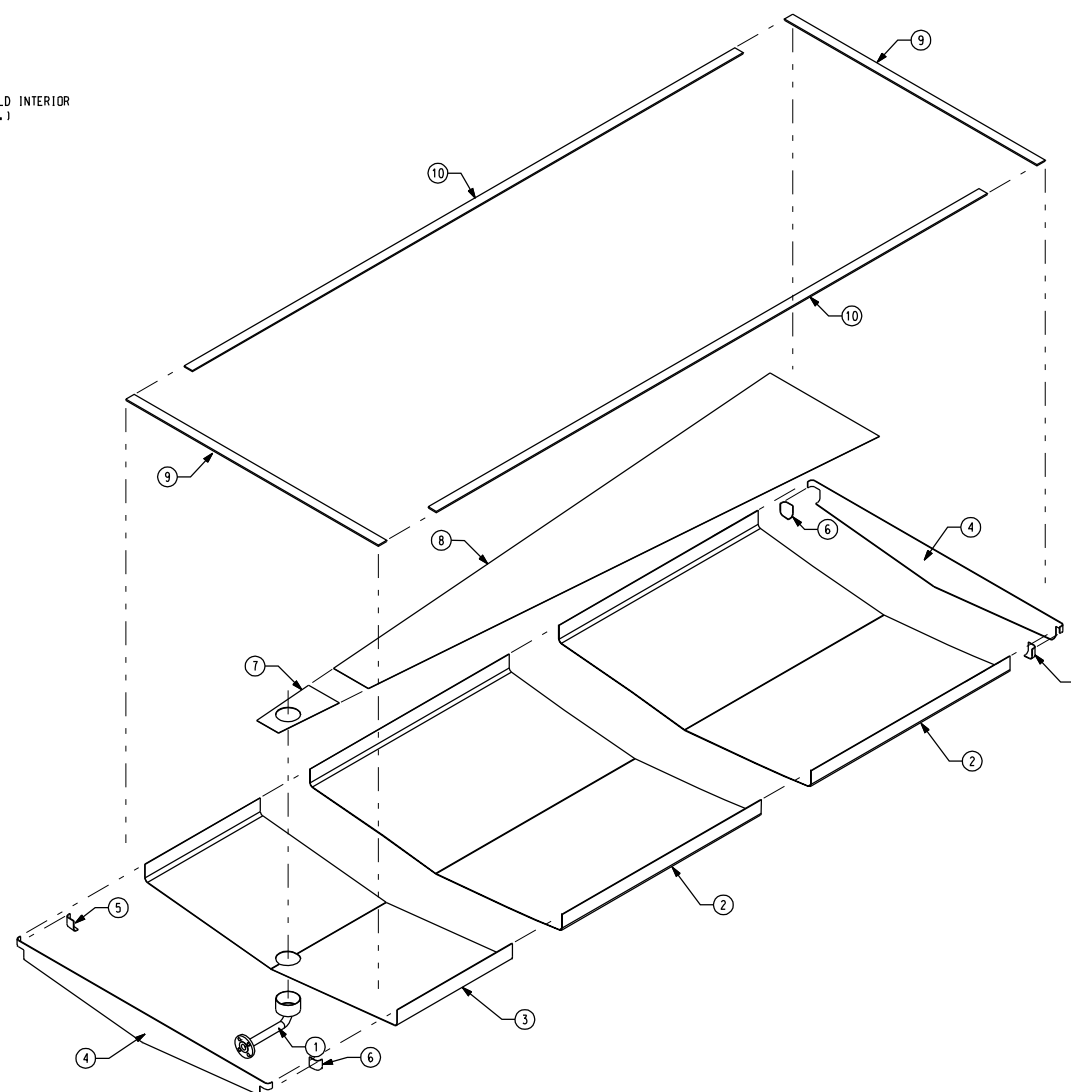
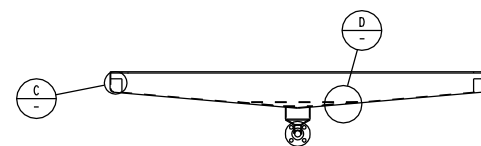
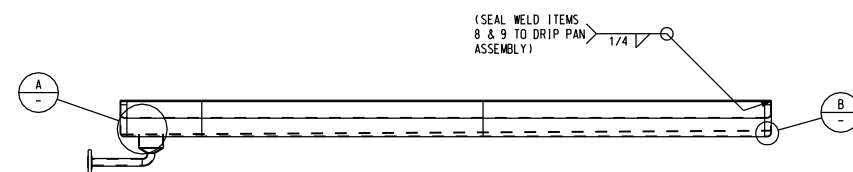
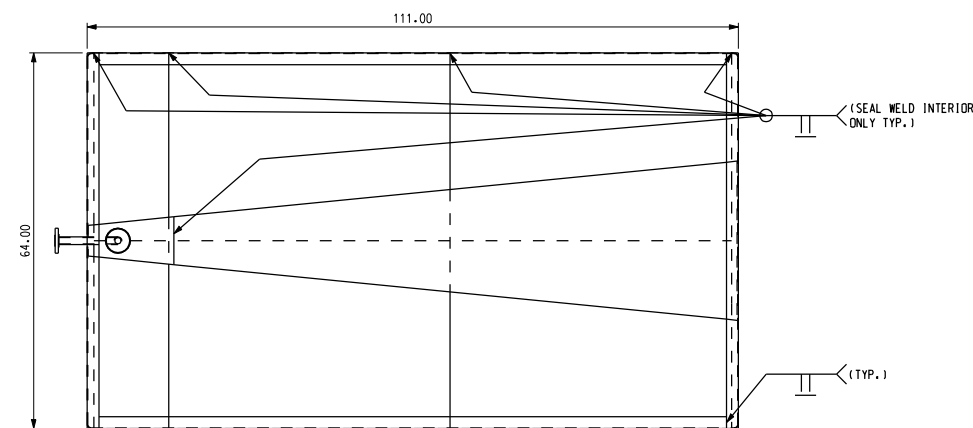
Sheet reference
number:

EG&G Contract No.	
DACA87-89-C-0076	
Sheet	Re

[illegible]

NOTES:

1. ALL INTERIOR WELDS SHALL BE SEAL WELDS.
2. ALL INTERIOR WELDS SHALL BE GROUND WITH 150 GRIT TO A 2B SURFACE FINISH.
3. ALL BEND RELIEFS TO BE MINIMUM.
4. ALL INTERIOR BEND RADII TO BE MINIMUM OF 5/8".
5. CONDITION PARTS FOR SAFE HANDLING NO CUTTING EDGES PERMISSIBLE.
6. CLEAN AND PREPARE WELD SURFACES TO COMPLY WITH WELD CALLOUTS AND APPLICABLE SPECIFICATIONS.
7. PARTS TO BE CLEAN OF ANY WELD SPLATTER.



2	PLATE, 1/4"x2"x107", CS			
2	PLATE, 1/4"x2"x64", CS			
1	SHEET, 12 GA, 27.12" x 96.0", CS		SEE SHEET 2	
1	SHEET, 12 GA, 8.14" x 14.64", CS		SEE SHEET 2	
2	SHEET, 12 GA, 2.40" x 2.61", CS		SEE SHEET 2	
2	SHEET, 12 GA, 2.40" x 2.61", CS		SEE SHEET 2	
2	SHEET, 12 GA, 6.63" x 65.29", CS		SEE SHEET 2	
1	SHEET, 12 GA, 12.76" x 69.81", CS		SEE SHEET 2	
2	SHEET, 12 GA, 48" x 69.81", CS		SEE SHEET 2	
1	DRAIN FLANGE ASSEMBLY		SEE SHEET 2	
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	I
Bill of Material				

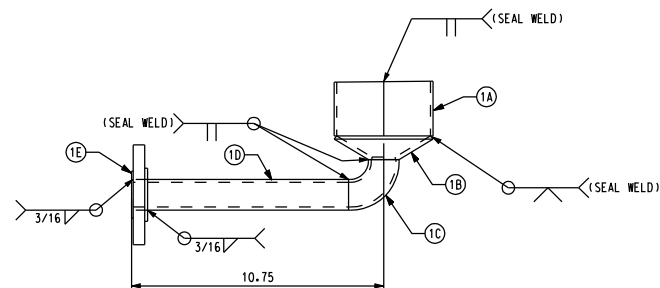
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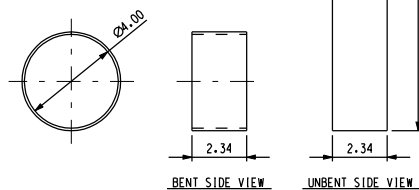
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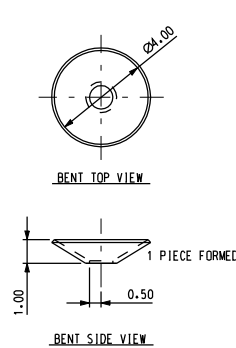
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DRAIN FLANGE ASSEMBLY ①



ITEM ⑩

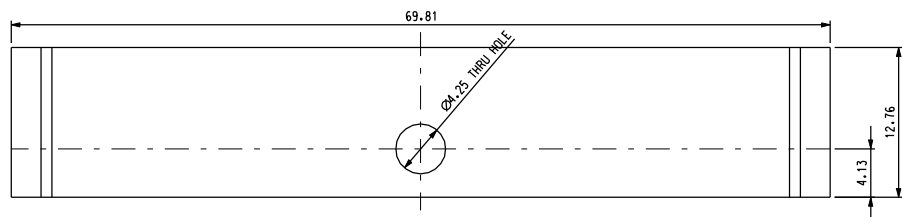


ITEM ⑩⑥

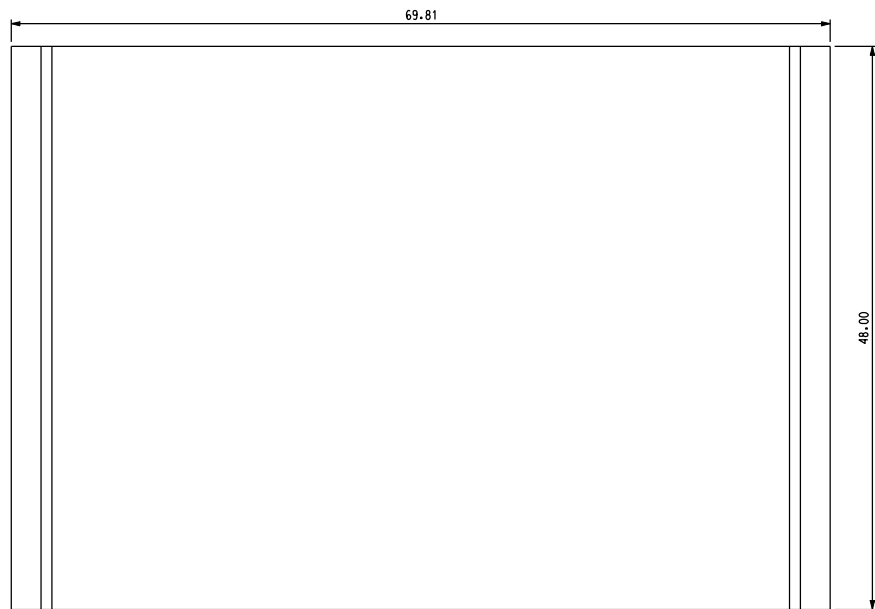
1	FLANGE, 1", 150#, RF, SD, CS			1E
AS REQ'D	PIPE, 1", SCH 40, CS			1D
1	ELBOW, 90°, 1", SCH 40, BW, CS			1C
1	SHEET, 12 GA, CS			1B
1	SHEET, 12 GA, 2.34" x 12.76", CS			1A
1	DRAIN FLANGE ASSEMBLY			1
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	ITEM
Bill of Material				

NOTES:
1. SEE SHEET 1 FOR NOTES.

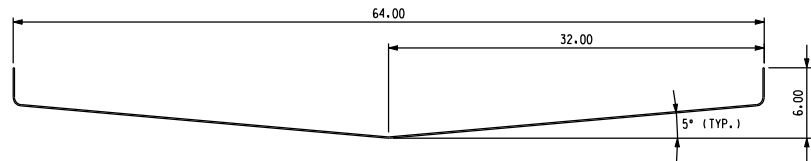
NOT FOR CONSTRUCTION



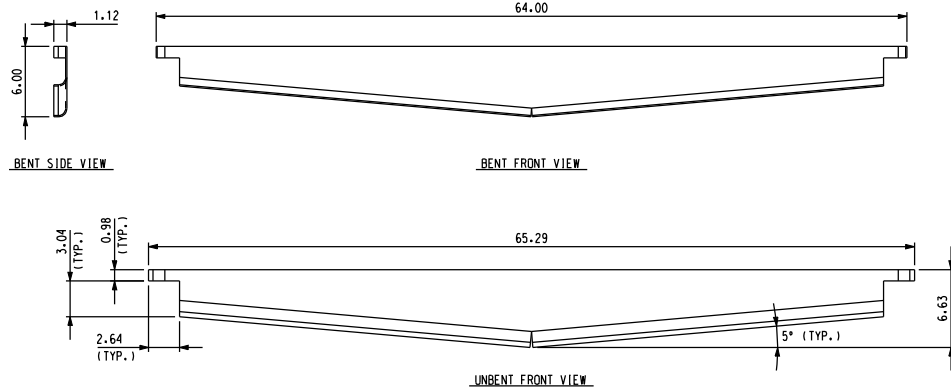
ITEM 3 UNBENT TOP VIEW



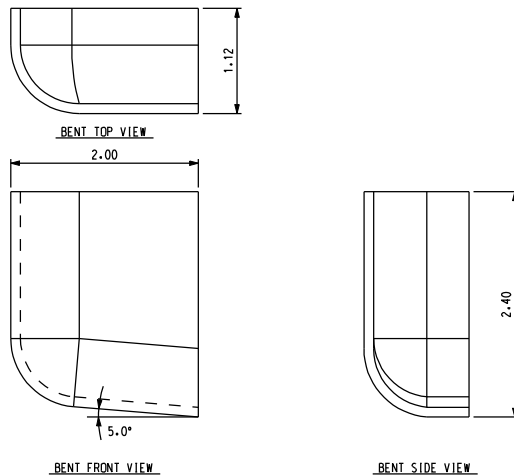
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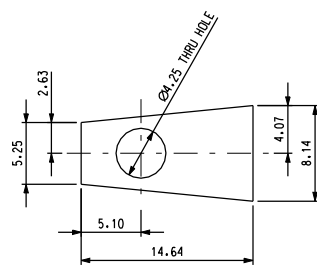
ITEMS ②③



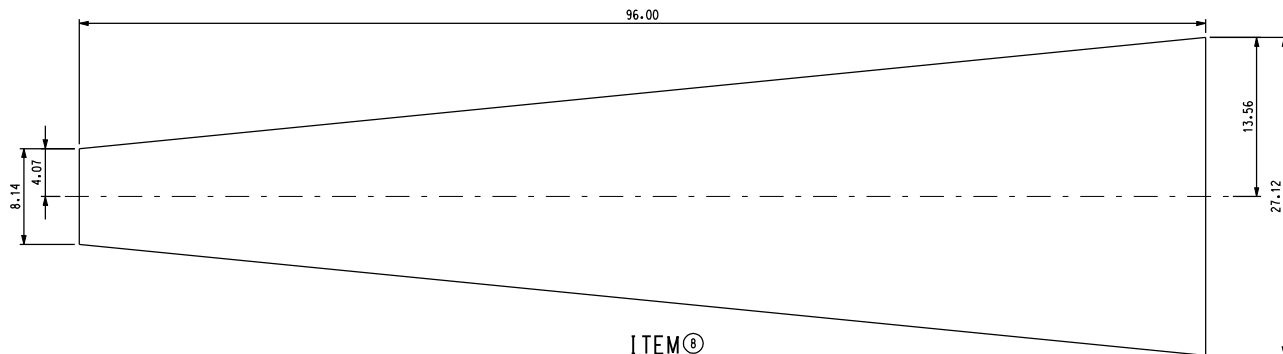
ITEM ④
(1 AS SHOWN, 1 MIRROR)



ITEMS ⑤⑥
ITEM 5 - 2 AS SHOWN
ITEM 6 - 2 MIRROR



ITEM ⑦



ITEM ⑧

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = ±.1
.XX = ±.06
.XXX = ±.015
ANGLES = 10°-30°

OA	ISSUED FOR CONSTRUCTION	Date	Approved
Symbol	Description	Date	Approved
Revisions			
DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND		US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA	
EG&G A Division of URS		TOOELE ARMY DEPOT TOOELE, UTAH	
CHEMICAL STOCKPILE DISPOSAL PROGRAM OFF SITE AREA 10 - SECONDARY WASTE SAMPLING (SWS) DVS-AIRLOCK DRAIN PAN ASSEMBLY			
Drawn by: SD NICHOLS	Date: 06/30/08	Checked by: EG&G Approved	Scale: NO SCALE
Engineer: PMCD Mgr. Concur: N/A	Sheet reference number: EG-22-M-8231	EG&G Contract No. DACAB7-89-C-0076	Rev. 0A

5

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NOTES:

1. ALL INTERIOR WELDS SHALL BE SEAL WELDS.
2. ALL INTERIOR WELDS SHALL BE GROUND WITH 150 GRIT TO A 2B SURFACE FINISH.
3. ALL BEND RELIEFS TO BE MINIMUM.
4. ALL INTERIOR BEND RADIUS TO BE MINIMUM OF 5/8".
5. CONDITION PARTS FOR SAFE HANDLING NO CUTTING EDGES PERMISSIBLE.
6. CLEAN AND PREPARE WELD SURFACES TO COMPLY WITH WELD CALLOUTS AND APPLICABLE SPECIFICATIONS.
7. PARTS TO BE CLEAN OF ANY WELD SPLATTER.




NOT FOR CONSTRUCTION


2	PLATE, 1/4"x2"x64", CS			
2	PLATE, 1/4"x2"x107", CS			
4	SHEET, 12 GA. CS		SEE SHEET 2	
2	SHEET, 12 GA. 1.76" x 61.77", CS		SEE SHEET 2	
1	SHEET, 12 GA. 65.29" x 108.76", CS		SEE SHEET 2	
1	SHEET, 12 GA. 65.29" x 84.88", CS		SEE SHEET 2	
1	SHEET, 12 GA. 65.29" x 84.88", CS		SEE SHEET 2	
2	SHEET, 12 GA. 12.88" x 108.76", CS		SEE SHEET 2	
2	SHEET, 12 GA. 72" x 108.76", CS		SEE SHEET 2	
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	
Bill of Material				

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = ±.1
.XX = ±.06
.XXX = ±.015
ANGLES = ±0°-30'

OA	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approval
	Revisions		

DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION AREDFEN PROVING GROUND, MARYLAND	US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
--	--

 **EG&G**
A Division of **URS**

 US Army Corps
of Engineers

CHEMICAL STOCKPILE DISPOSAL PROGRAM
OFF SITE

TOOELE ARMY DE
TOOELE, U

Drawn by: SD NICHOLAS		Date: 06/30/08		AREA 10 - SECONDARY WASTE SAMPLING (SWS) DVS - SKIN ASSEMBLY	
Checked by:		EG&G Approved:		Sheet reference number:	
Engineer:		PMCD Mgr. Concur:		EG&G Contract No. DAC487-89-C-007	
		N/A		EG-22-M-8232	
		NO SCALE		Sheet 1 of 2	

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NOTES:
1.





NOT FOR CONSTRUCTION

AS REQ'D	HSS, 2"x2"x1/4", A500 GR. G, CS				
1	INTERIOR FRAME WELDMENT			THIS SHEET	
1	SKIN ASSEMBLY			EG-22-M-B232	
1	DRAIN PAN ASSEMBLY			EG-22-M-B231	
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER		
Bill of Material					

OA	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approval
	Revisions		

DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION	US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
--	--

ABERDEEN PROVING GROUND, MARYLAND		US Army Corps of Engineers		TODELE ARMY DEPOT TODELE, U.S.	
 EG&G A Division of UDS		 CHEMICAL STOCKPILE DISPOSAL PROGRAM OFF SITE			
Drawn by: SD NICHOLAS Date: 06/30/08		AREA 10 - SECONDARY WASTE SAMPLING (SWS) DVS - ENCLOSURE ASSEMBLY			
Checked by: EGGG Approved:		Scale:		Sheet reference number:	
Engineer: PMCD Mgr. Concur: N/A		NO SCALE		EGGG Contract No: DACAB789-C-0078	
		EG-22-M-8233		Sheet 1 of 1	

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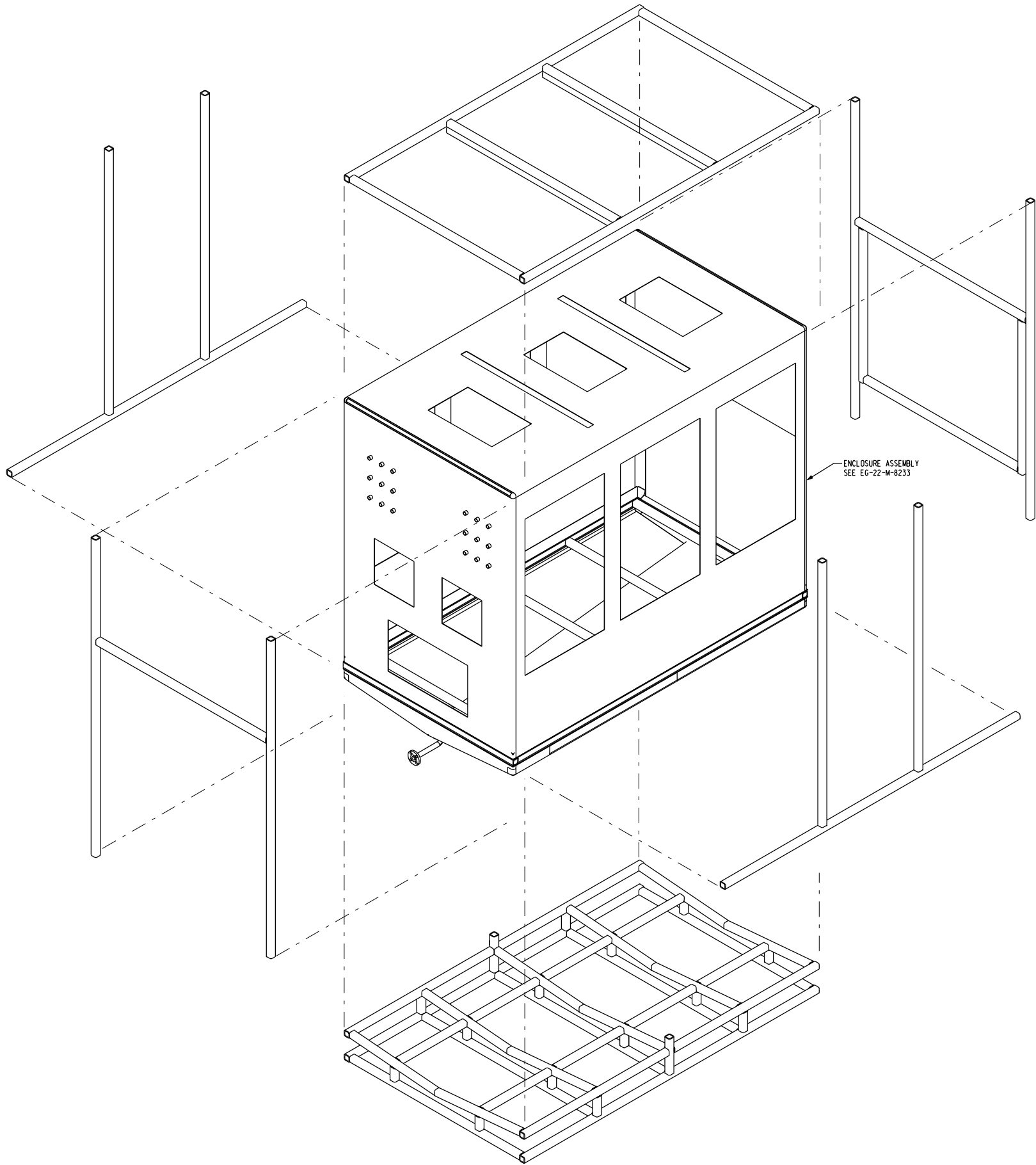
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2 UNCONTROLLED COPY - UNLESS STAMPED OTHERWISE BY DCC¹

Drawing Status											
NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK.	DESIGNED	PROD.	IE	PROD.	D.L.O.C.		
0A	06/30/08	ISSUED PER EWO 379603 & ECP 4554	SDN								

NOTES:
1. SEE SHEET 2 FOR FRAME ASSEMBLY DETAILS.




ENCLOSURE ASSEMBLY
SEE EG-22-M-8233

EXPLODED DVS FRAME ASSEMBLY

NOT FOR CONSTRUCTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES:
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = ±.1
.XX = ±.06
.XXX = ±.015
ANGLES = 30°-30°

OA	ISSUED FOR CONSTRUCTION			
Symbol	Description		Date	Approved
Revisions				
DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND		US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA		
 EG&G A Division of URS		US Army Corps of Engineers TOOELE ARMY DEPOT TOOELE, UTAH CHEMICAL STOCKPILE DISPOSAL PROGRAM OFF SITE AREA 10 - SECONDARY WASTE SAMPLING (SWS) DVS - FRAME ASSEMBLY		
Drawn by: SD NICHOLS				
Checked by:	EG&G Approved:	Scale:	Sheet reference number:	EG&G Contract No. DACAB7-89-C-0076
Engineer:	PMCD Mgr. Concur: N/A	NO SCALE	EG-22-M-8234	Sheet 1 of 2 Rev. 0A

5

4

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2 UNCONTROLLED COPY - UNLESS STAMPED OTHERWISE BY DCC¹

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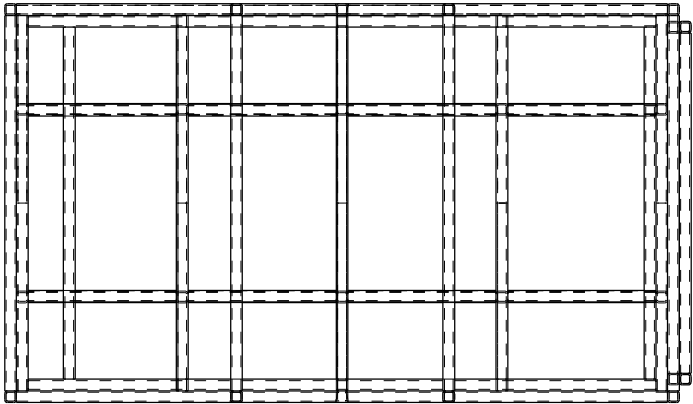
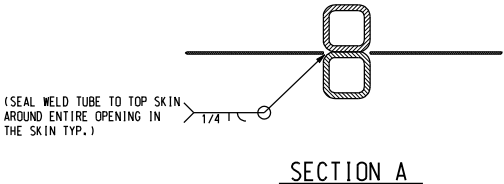
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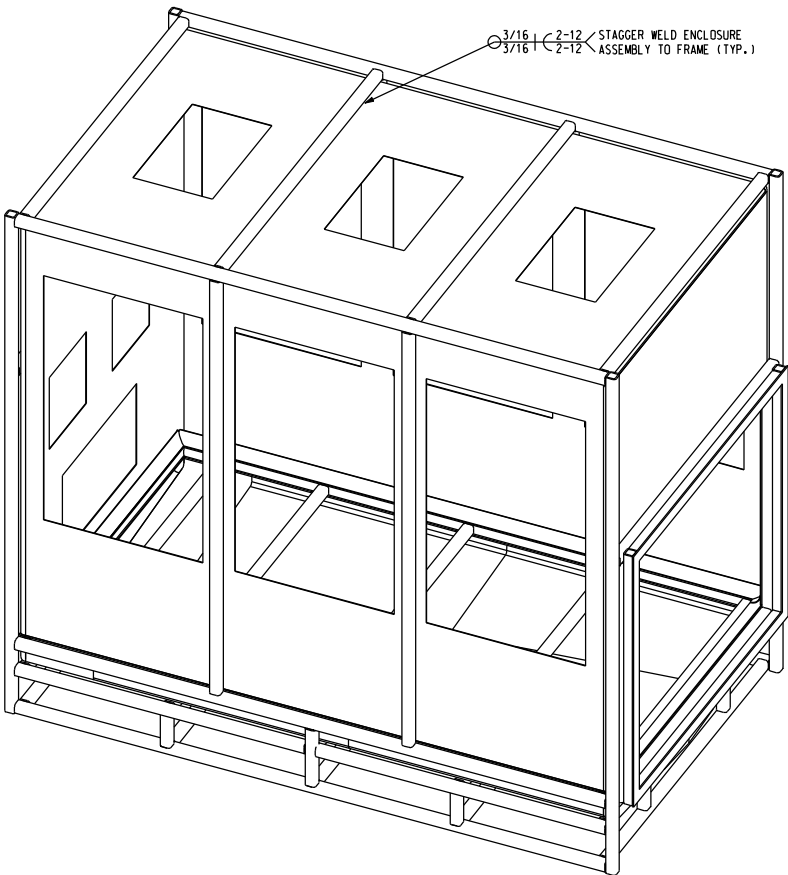
2 UNCONTROLLED COPY - UNLESS STAMPED OTHERWISE BY DCC¹

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0A	06/30/08	ISSUED PER EWO 379603 & ECP 4554	SDN						

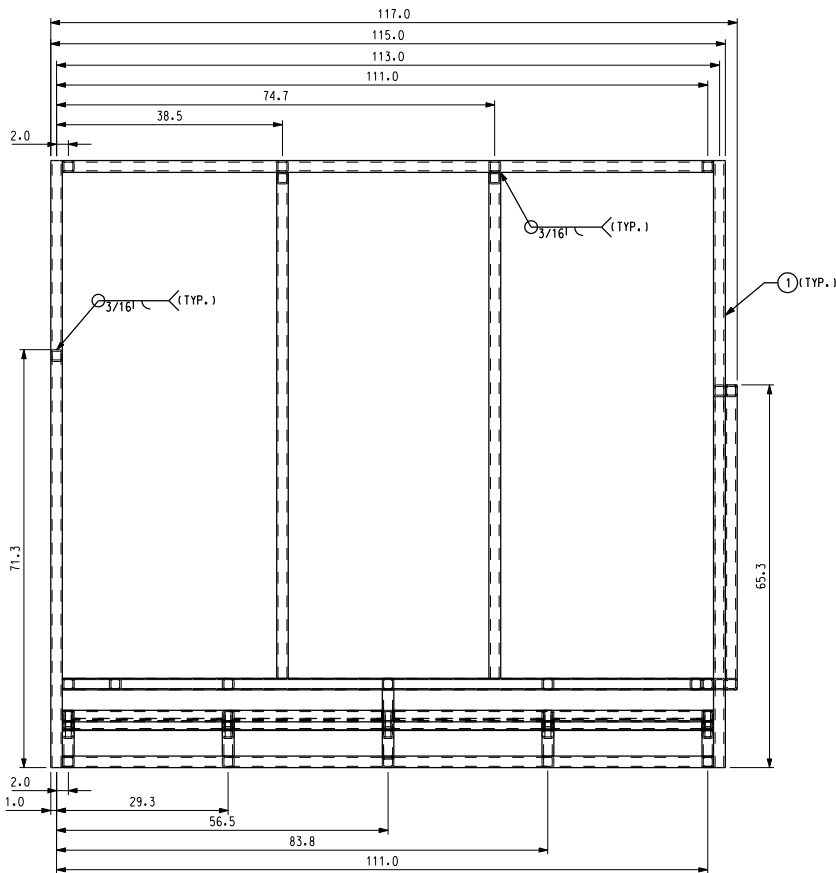
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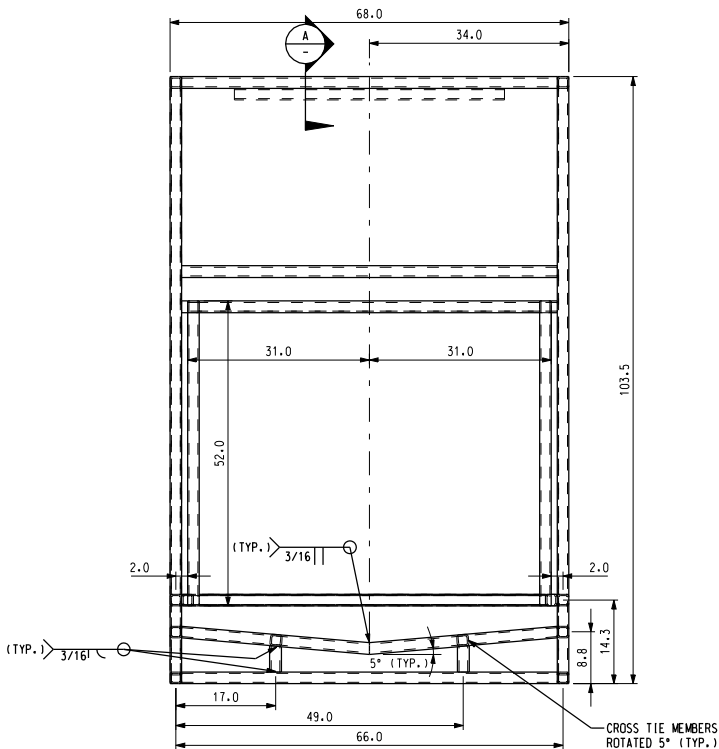
TOP VIEW
DRIP PAN AND ENCLOSURE SKIN REMOVED FOR CLARITY



ASSEMBLY ISOMETRIC VIEW



FRONT VIEW
DRIP PAN AND ENCLOSURE SKIN REMOVED FOR CLARITY



SIDE VIEW
DRIP PAN AND ENCLOSURE SKIN REMOVED FOR CLARITY

NOT FOR CONSTRUCTION

				13
				12
				11
				10
				9
				8
				7
				6
				5
				4
				3
				2
				1
AS REQ'D	HSS, 2"x2"x1/4", A500 GR. B, CS			
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	ITEM
Bill of Material				

0A	ISSUED FOR CONSTRUCTION								
Symbol	Description	Date	Approved						
Revisions									
DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND					US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA				
EG&G A Division of URS					TOOELE ARMY DEPOT TOOELE, UTAH				
CHEMICAL STOCKPILE DISPOSAL PROGRAM OFF SITE					AREA 10 - SECONDARY WASTE SAMPLING (SWS) DVS - FRAME ASSEMBLY				
Drawn by: SD NICHOLS		Date: 06/30/08		Checked by: EG&G Approved		Scale: NO SCALE		Sheet reference number: EG-22-M-8234	
Engineer: PMCD Mgr. Concur: N/A								EG&G Contract No. DACAB7-89-C-0076	
								Sheet 2 of 2	
								Rev. 0A	

5

4

3

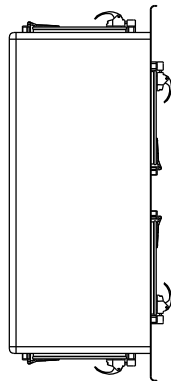
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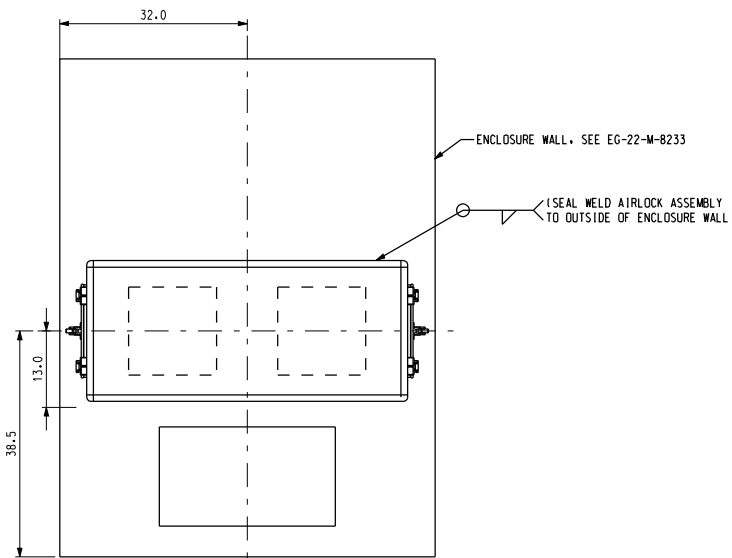
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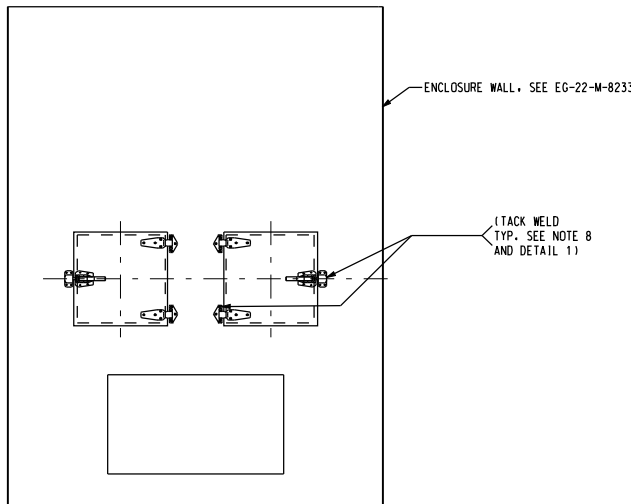
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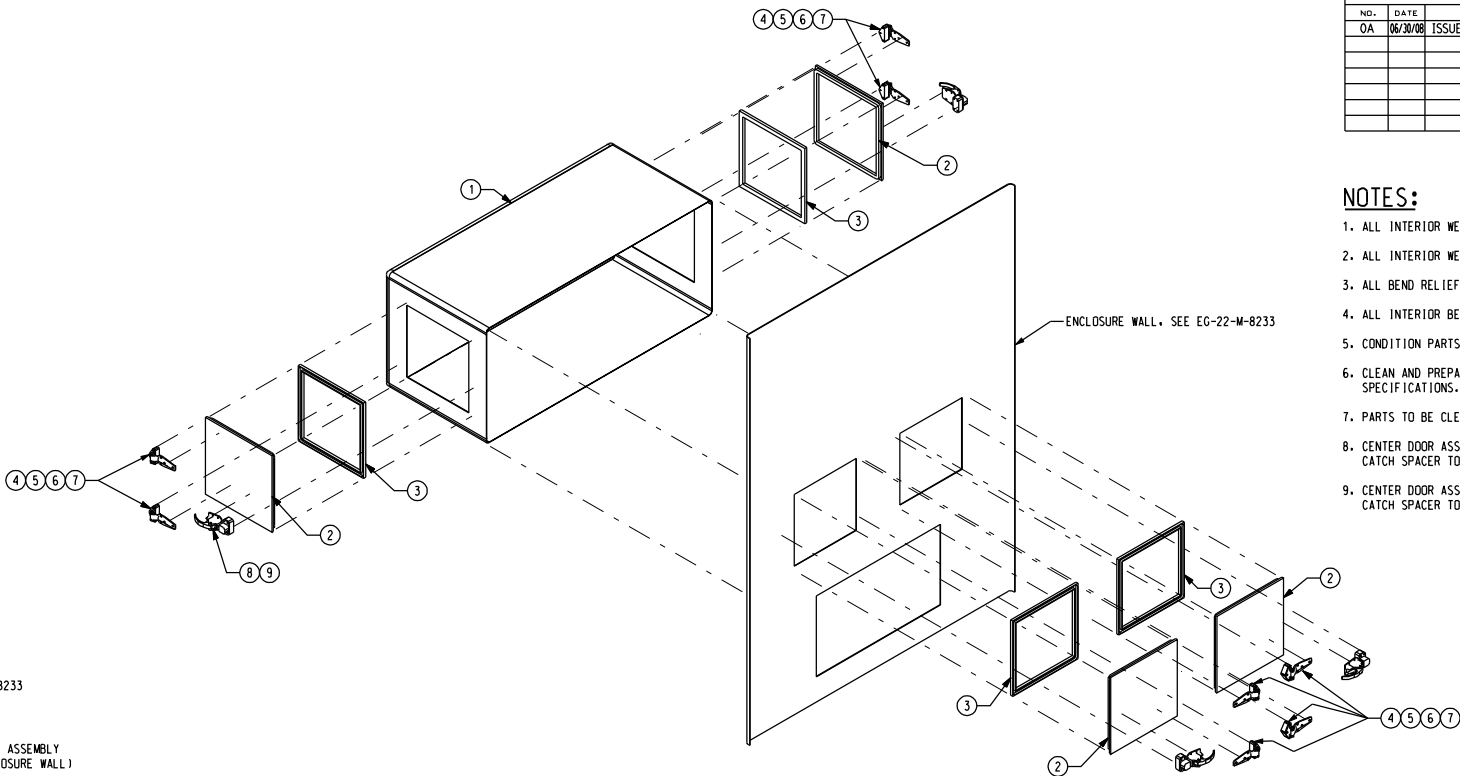
ASSEMBLY TOP VIEW



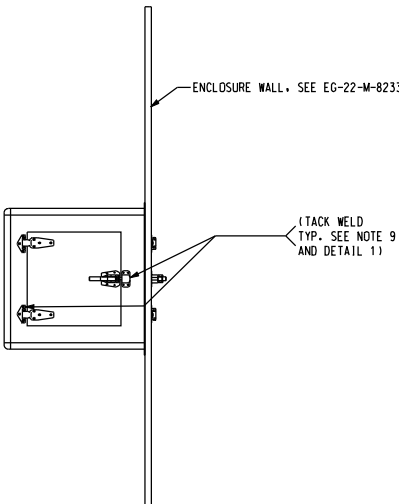
ASSEMBLY FRONT VIEW



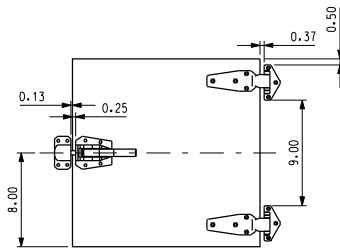
ASSEMBLY BACK VIEW
(INSIDE ENCLOSURE)



EXPLODED AIRLOCK ASSEMBLY



ASSEMBLY SIDE VIEW



DETAIL 1

DRAWING STATUS									
NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK.	INSTR.	PROJ.	DE	PROJ.	D.L.S.C.
0A	06/30/08	ISSUED PER EWO 379603 & ECP 4554	SDN						

- NOTES:
1. ALL INTERIOR WELDS SHALL BE SEAL WELDS.
 2. ALL INTERIOR WELDS SHALL BE GROUND WITH 150 GRIT TO A 2B SURFACE FINISH.
 3. ALL BEND RELIEFS TO BE MINIMUM.
 4. ALL INTERIOR BEND RADIUS TO BE MINIMUM OF 5/8".
 5. CONDITION PARTS FOR SAFE HANDLING NO CUTTING EDGES PERMISSIBLE.
 6. CLEAN AND PREPARE WELD SURFACES TO COMPLY WITH WELD CALLOUTS AND APPLICABLE SPECIFICATIONS.
 7. PARTS TO BE CLEAN OF ANY WELD SPLATTER.
 8. CENTER DOOR ASSEMBLY OVER OPENING IN PANEL AND TACK WELD HINGE SPACER AND CATCH SPACER TO PANEL. TYPICAL 2 INTERIOR DOORS.
 9. CENTER DOOR ASSEMBLY OVER OPENING IN AIRLOCK AND TACK WELD HINGE SPACER AND CATCH SPACER TO AIRLOCK. TYPICAL 2 AIRLOCK DOORS.

NOT FOR CONSTRUCTION

				13
				12
				11
				10
4	AIRLOCK LATCH SHIM		SEE SHEET 3	9
4	AIRLOCK DOOR LATCH WITH CATCH	McMASTER CARR	1256A1	8
24	MACHINE SCREW, OVAL HEAD, 8-32 x 3/4"	McMASTER CARR	91802A197	7
8	AIRLOCK DOOR HINGE	McMASTER CARR	1264A120	6
8	AIRLOCK HINGE SHIM		SEE SHEET 3	5
8	AIRLOCK HINGE SPACER		SEE SHEET 3	4
4	AIRLOCK DOOR GASKET		SEE SHEET 3	3
4	AIRLOCK DOOR ASSEMBLY		SEE SHEET 2	2
1	AIRLOCK BODY ASSEMBLY		SEE SHEET 2	1
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	ITEM

Bill of Material

0A	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approved
Revisions			

DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND	US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
---	--

EG&G A Division of URS	US Army Corps of Engineers	TOOELE ARMY DEPOT TOOELE, UTAH
---------------------------	----------------------------	-----------------------------------

CHEMICAL STOCKPILE DISPOSAL PROGRAM OFF SITE AREA 10 - SECONDARY WASTE SAMPLING (SWS) DVS - AIRLOCK ASSEMBLY

Drawn by: SD NICHOLS	Date: 07/28/08	Checked by: EG&G Approved	Scale: NO SCALE	Sheet reference number: EG-22-M-8235	EG&G Contract No. DAC87-89-C-0076
Engineer: PMCD Mgr. Concur: N/A				Sheet 1 of 3	Rev. 0A

5

4

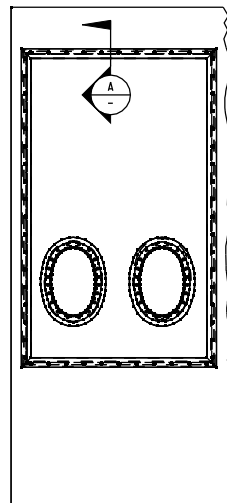
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2 UNCONTROLLED COPY - UNLESS STAMPED OTHERWISE BY DCC¹

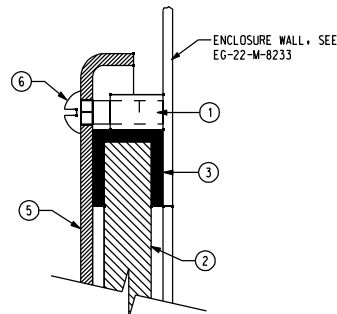
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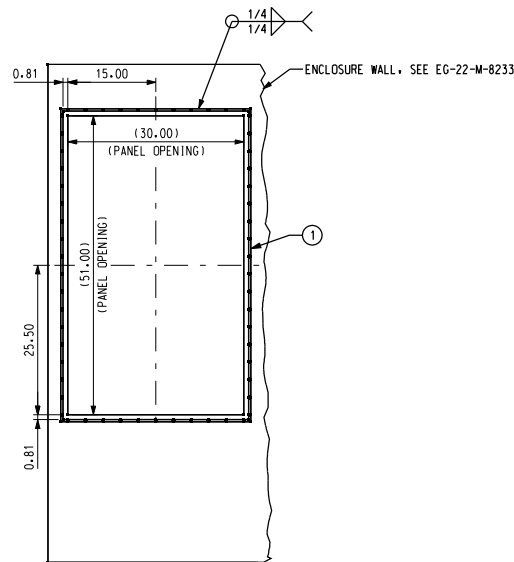
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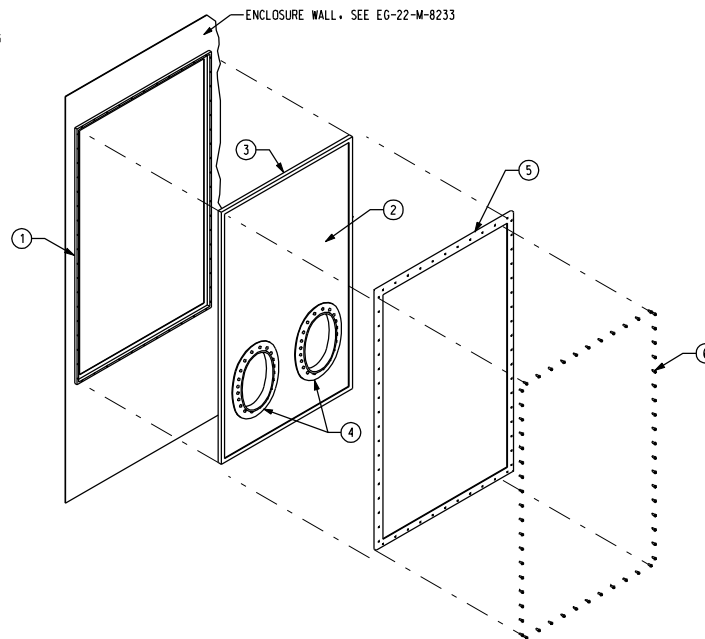
ASSEMBLY FRONT VIEW



SECTION A



BACK PLATE WELDMENT

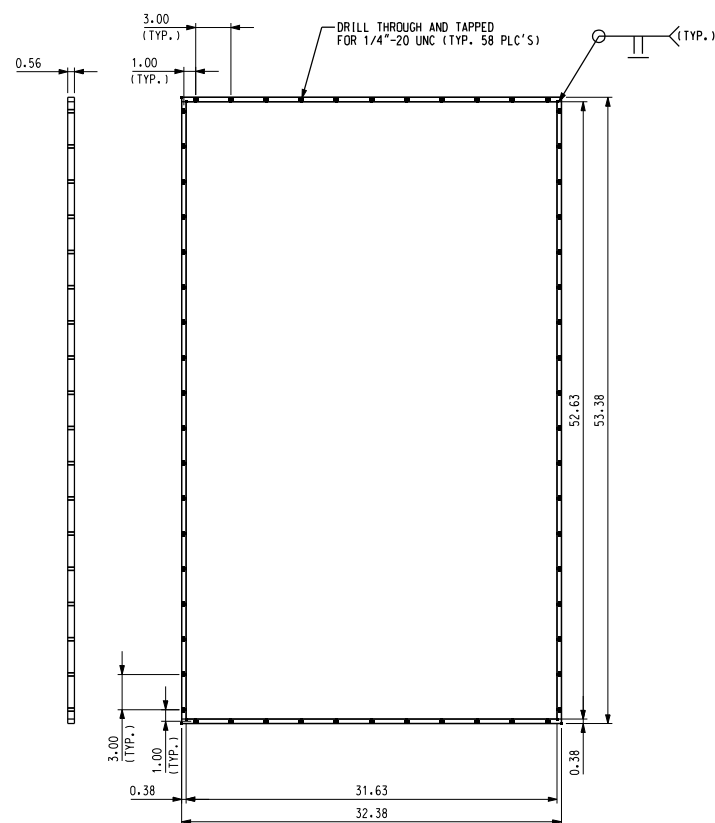


EXPLODED WINDOW ASSEMBLY

Drawing Status									
NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK.	INSP.	PROD.	DE	PROD.	D.A.G.C.
0A	06/30/08	ISSUED PER EWO 379603 & ECP 4554	SDN						

NOTES:

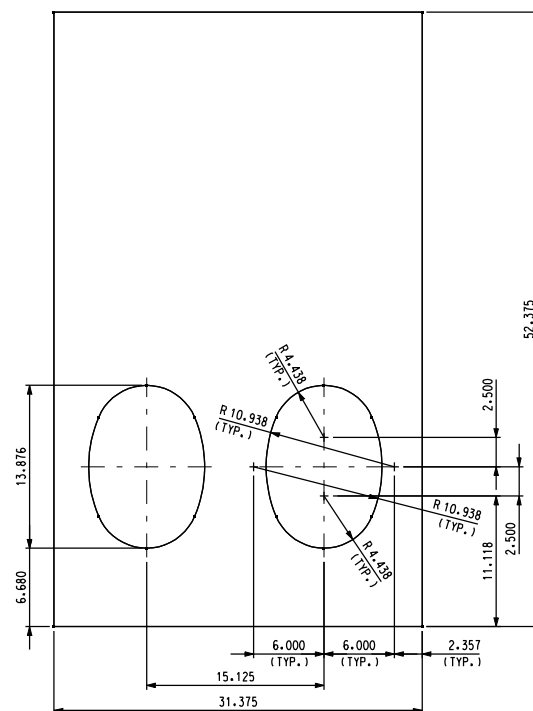
1. ALL INTERIOR WELDS SHALL BE SEAL WELDS.
2. ALL INTERIOR WELDS SHALL BE GROUND WITH 150 GRIT TO A 2B SURFACE FINISH.
3. ALL BEND RELIEFS TO BE MINIMUM.
4. ALL INTERIOR BEND RADIUS TO BE MINIMUM OF 5/8" UNLESS NOTED OTHERWISE.
5. CONDITION PARTS FOR SAFE HANDLING NO CUTTING EDGES PERMISSIBLE.
6. CLEAN AND PREPARE WELD SURFACES TO COMPLY WITH WELD CALLOUTS AND APPLICABLE SPECIFICATIONS.
7. PARTS TO BE CLEAN OF ANY WELD SPLATTER.
8. CENTER DOOR ASSEMBLY OVER OPENING IN PANEL AND TACK WELD HINGE SPACER AND CATCH SPACER TO PANEL. TYPICAL 2 INTERIOR DOORS.
9. CENTER DOOR ASSEMBLY OVER OPENING IN AIRLOCK AND TACK WELD HINGE SPACER AND CATCH SPACER TO AIRLOCK. TYPICAL 2 AIRLOCK DOORS.

NOT FOR CONSTRUCTION

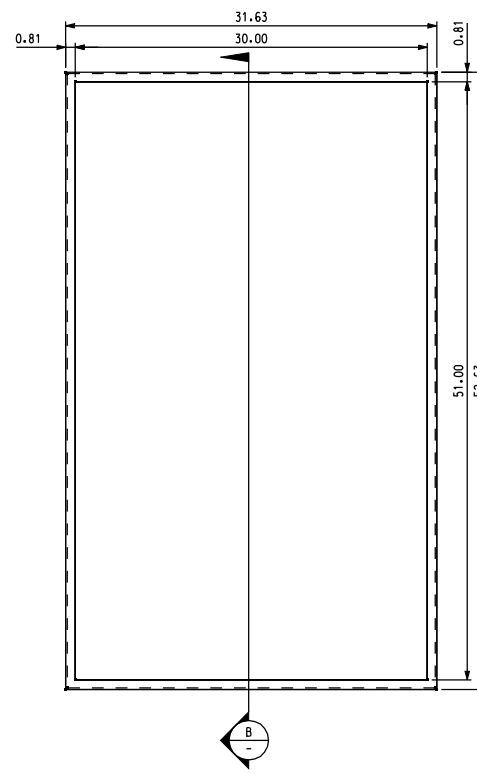
SIDE VIEW

FRONT VIEW

ITEM ①



ITEM ②



FRONT VIEW

SECTION B

ITEM ③

				13
				12
				11
				10
				9
				8
				7
58	MACHINE SCREW, SLOTTED HEAD, 1/4"-20 x 5/8", CS	McMASTER CARR	902764539	6
1	OPERATOR WINDOW FRAME ASSEMBLY	SEE SHEET 2		5
2	OVAL ENCLOSURE RING ASSEMBLY W/PURGING AND EJECTION TOOL	CRL	39583 W/36534	4
1	OPERATOR WINDOW GASKET, EPDM, 40 DUROMETER			3
1	OPERATOR WINDOW, 1/2" THK. AR POLYCARBONATE	MAKROLON		2
1	BACK PLATE, 3/8"x9/16"x170", CS			1
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	ITEM

Bill of Material

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = .1
.XX = .06
.XXX = .015
ANGLES = 50°-30°

0A	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approved

DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND	US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
---	--

EG&G A Division of URS		US Army Corps of Engineers TOOELE ARMY DEPOT TOOELE, UTAH	
Drawn by: SD NICHOLS		Date: 07/29/08	
Checked by: EG&G Approved:		Scale: NO SCALE	
Engineer: PMCD Mgr. Concur: N/A		Sheet reference number: EG-22-M-8236	
		EG&G Contract No. DACAB7-89-C-0076	
		Rev. 0A	

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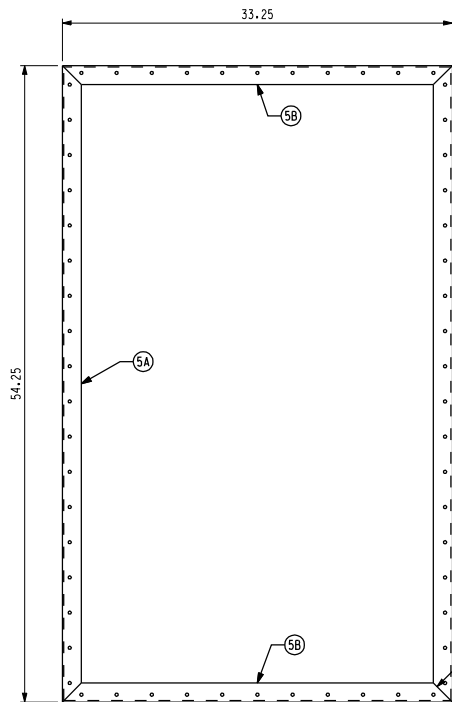
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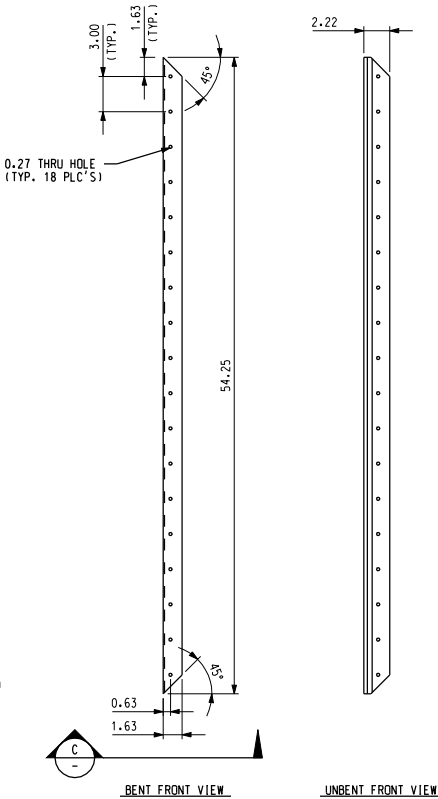
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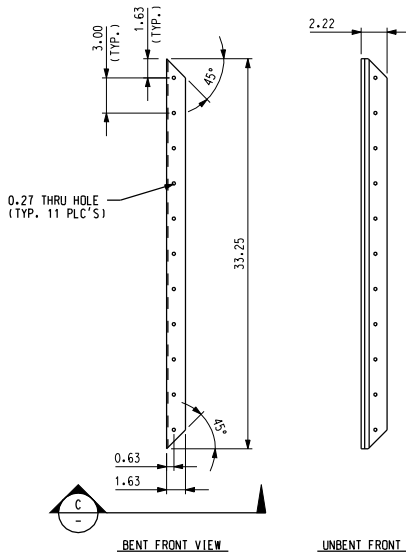
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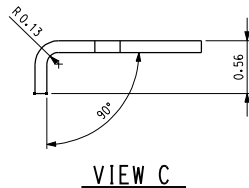
ITEM 5A
OPERATOR WINDOW FRAME ASSEMBLY



ITEM 5A
(2 REQ'D)



ITEM 5B
(2 REQ'D)



Drawing Status									
NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK.	DESIGNED	ENGR.	DR.	PROJ.	D.L.O.C.
0A	06/30/08	ISSUED PER EWO 379603 & ECP 4554	SDN						

NOTES:
1. SEE SHEET 1 FOR NOTES.

NOT FOR CONSTRUCTION


2	SHEET, 11 GA, 2.22"x33.13, CS			5B
2	SHEET, 11 GA, 2.22"x54.25", CS	MAKROLON		5A
1	OPERATOR WINDOW FRAME ASSEMBLY			5
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	ITEM

Bill of Material

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = .1
.XX = .06
.XXX = .015
ANGLES = 50°-30°

OA	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approved
Revisions			

DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND	US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
---	--

 EG&G A Division of URS	US Army Corps of Engineers TOOELE ARMY DEPOT TOOELE, UTAH	CHEMICAL STOCKPILE DISPOSAL PROGRAM OFF SITE
Drawn by: SD NICHOLS	Date: 07/29/08	AREA 10 - SECONDARY WASTE SAMPLING (SWS)
Checked by: EG&G Approved:	Scale: NO SCALE	Sheet reference number: EG-22-M-8236
Engineer: PMCD Mgr. Concur: N/A	EG-22-M-8236	EG&G Contract No. DACAB7-89-C-0076
	Sheet 2 of 2	Rev. OA

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2 UNCONTROLLED COPY - UNLESS STAMPED OTHERWISE BY DCC¹



NOTES:

1. ALL INTERIOR WELDS SHALL BE SEAL WELDS.
2. ALL INTERIOR WELDS SHALL BE GROUND WITH 150 GRIT TO A 2B SURFACE FINISH.
3. ALL BEND RELIEFS TO BE MINIMUM.
4. ALL INTERIOR BEND RADII TO BE MINIMUM OF 5/8" UNLESS NOTED OTHERWISE.
5. CONDITION PARTS FOR SAFE HANDLING NO CUTTING EDGES PERMISSIBLE.
6. CLEAN AND PREPARE WELD SURFACES TO COMPLY WITH WELD CALLOUTS AND APPLICABLE SPECIFICATIONS.
7. PARTS TO BE CLEAN OF ANY WELD SPLATTER.
8. CENTER DOOR ASSEMBLY OVER OPENING IN PANEL AND TACK WELD HINGE SPACER AND CATCH SPACER TO PANEL. TYPICAL 2 INTERIOR DOORS.
9. CENTER DOOR ASSEMBLY OVER OPENING IN AIRLOCK AND TACK WELD HINGE SPACER AND CATCH SPACER TO AIRLOCK. TYPICAL 2 AIRLOCK DOORS.



NOT FOR CONSTRUCTION

[illegible]

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = ±.1
.XX = ±.06
.XXX = ±.015
ANGLES = ±0°-30'

OA	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approved
	Revisions		

DEPARTMENT OF THE ARMY
PROGRAM MANAGER FOR
CHEMICAL DEMILITARIZATION
ABERDEEN PROVING GROUND, MARYLAND

US ARMY ENGINEER DISTRICT SACRAMENTO
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA



EG&G
A Division of **UTB**

 US Army Corps of Engineers

CHEMICAL STOCKPILE DISPOSAL PROGRAM
OFF SITE

Drawn by:	Date:
SD NICHOLAS	07/29/0

AREA 10 - SECONDARY WASTE SAMPLING (SWS)
DVS-DRAIN GLOVE PORT/WINDOW ASSEMBLY

3D NICHOLE'S	01/23/08	DU
Checked by:	EG&G	Approved

Scale:	Sheet reference
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Engineer:	PMCD Mgr
-----------	----------

number: **FC-22-M-8237**

		N/
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EG-22-M-0237

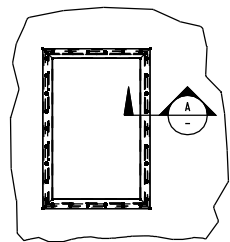
1 of 1 0A

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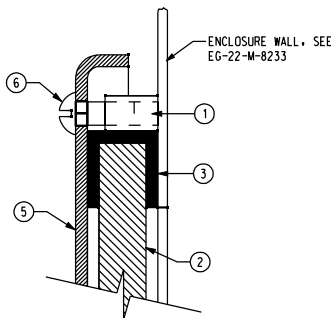
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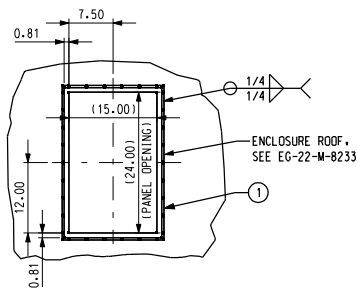
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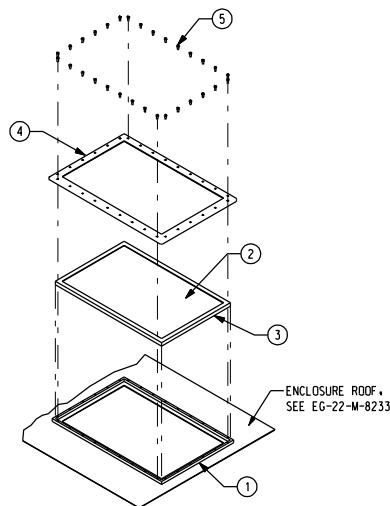
ASSEMBLY TOP VIEW



SECTION A



BACK PLATE WELDMENT

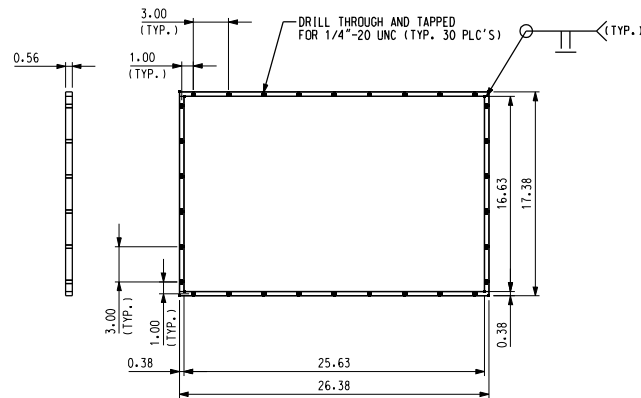


EXPLODED WINDOW ASSEMBLY

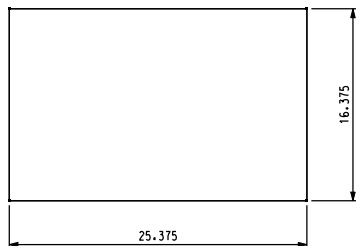
DRAWING STATUS									
NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK.	INSTR.	PROJ.	DE.	PROJ.	D.L.S.C.
0A	06/30/08	ISSUED PER EWO 379603 & ECP 4554	SDN						

NOTES:

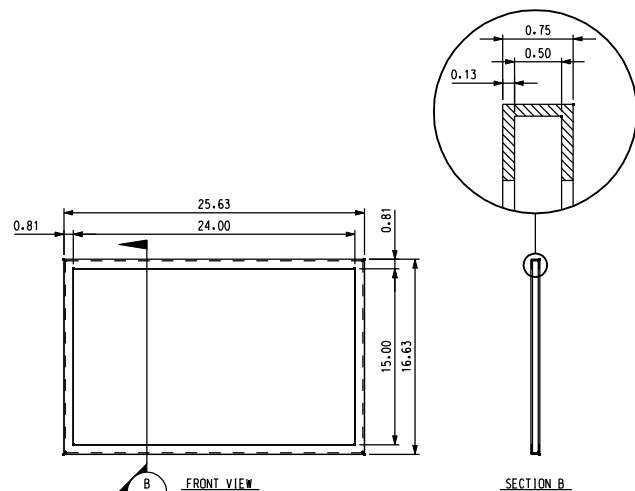
1. ALL INTERIOR WELDS SHALL BE SEAL WELDS.
2. ALL INTERIOR WELDS SHALL BE GROUND WITH 150 GRIT TO A 2B SURFACE FINISH.
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7. PARTS TO BE CLEAN OF ANY WELD SPLATTER.
8. CENTER DOOR ASSEMBLY OVER OPENING IN PANEL AND TACK WELD HINGE SPACER AND CATCH SPACER TO PANEL. TYPICAL 2 INTERIOR DOORS.
9. CENTER DOOR ASSEMBLY OVER OPENING IN AIRLOCK AND TACK WELD HINGE SPACER AND CATCH SPACER TO AIRLOCK. TYPICAL 2 AIRLOCK DOORS.



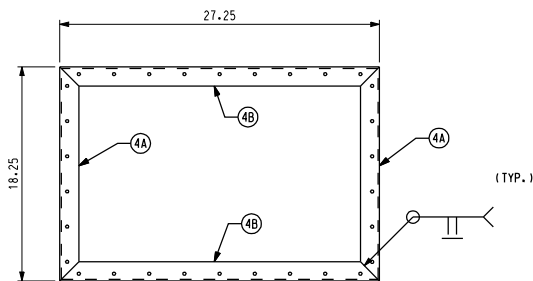
ITEM 1



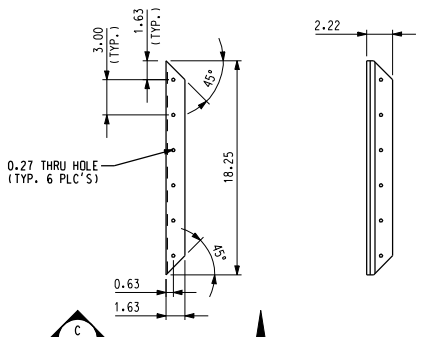
ITEM 2



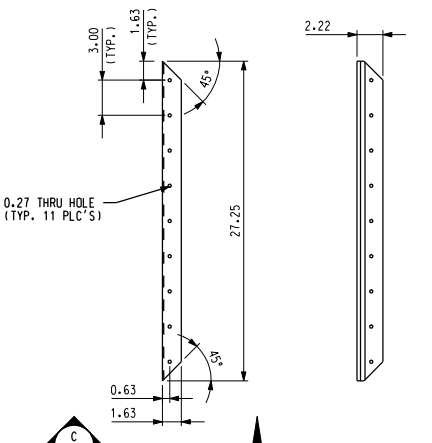
ITEM 3



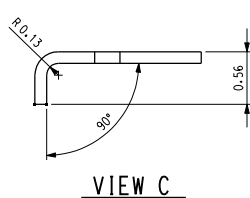
ITEM 4
OPERATOR WINDOW FRAME ASSEMBLY



ITEM 4A
(2 REQ'D)



ITEM 4B
(2 REQ'D)



VIEW C

NOT FOR CONSTRUCTION

QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	ITEM
30	MACHINE SCREW, SLOTTED HEAD, 1/4"-20 x 5/8", CS	McMASTER CARR	90276A539	5
1	OPERATOR WINDOW FRAME ASSEMBLY			4
1	OPERATOR WINDOW GASKET, EPDM, 40 DUROMETER			3
1	OPERATOR WINDOW, 1/2" THK. AR POLYCARBONATE	MAKROLON		2
1	BACK PLATE, 3/8"x9/16"x86.00", CS			1

Bill of Material

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = .1
.XX = .06
.XXX = .015
ANGLES = 50°-30°

NO.	DATE	REVISION DESCRIPTION	DATE	APPROVED
0A	07/30/08	ISSUED FOR CONSTRUCTION		

Symbol	Description	Date	Approved

DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND	US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
---	--

EG&G A Division of URS	US Army Corps of Engineers TOOELE ARMY DEPOT TOOELE, UTAH
Drawn by: SD NICHOLS	Date: 07/30/08
Checked by: EG&G Approved:	Scale: NO SCALE
Engineer: PMCD Mgr. Concur: N/A	Sheet reference number: EG-22-M-8238
	EG&G Contract No. DAC87-89-C-0076
	Rev. 1 of 1

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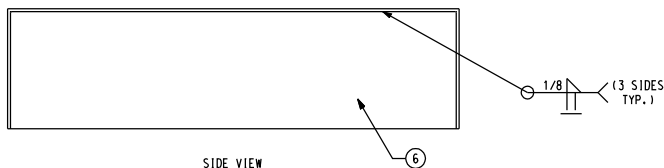
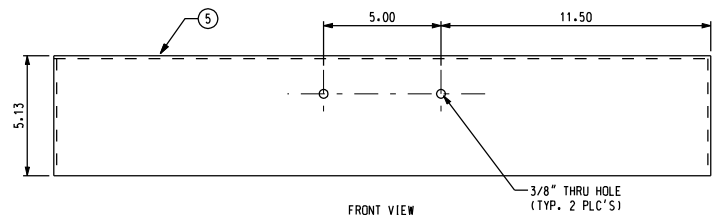
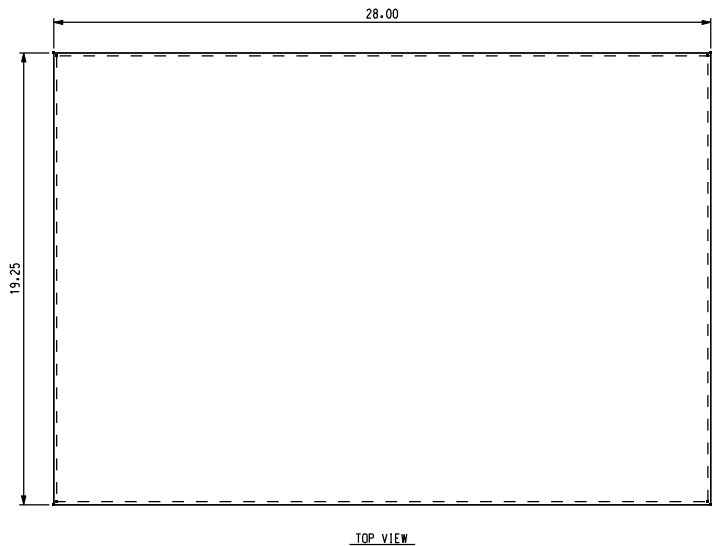
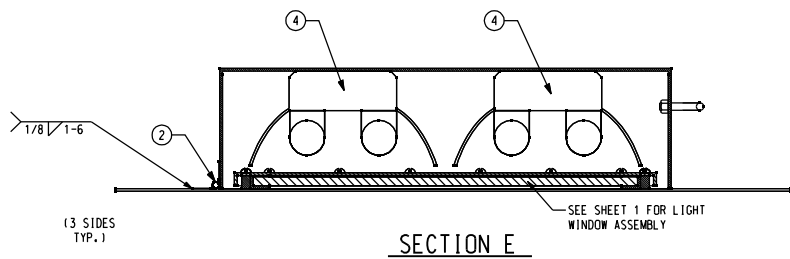
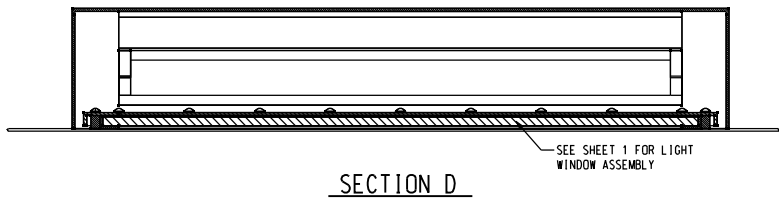
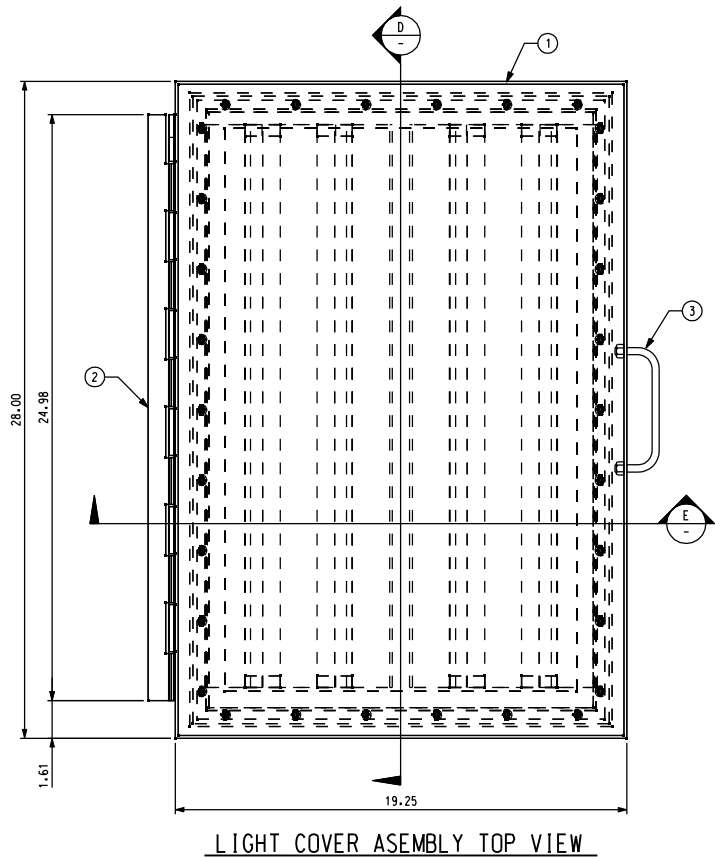
2 UNCONTROLLED COPY - UNLESS STAMPED OTHERWISE BY DCC¹

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DRAWING STATUS									
NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK.	ENGR.	PROD.	DE	PROD.	D.L.O.C.
0A	06/30/08	ISSUED PER EWO 379603 & ECP 4554	SDN						

- NOTES:
1. ALL BEND RELIEFS TO BE MINIMUM.
 2. CONDITION PARTS FOR SAFE HANDLING NO CUTTING EDGES PERMISSIBLE.
 3. CLEAN AND PREPARE WELD SURFACES TO COMPLY WITH WELD CALLOUTS AND APPLICABLE SPECIFICATIONS.
 4. PARTS TO BE CLEAN OF ANY WELD SPLATTER.
 5. CENTER LIGHT COVER OVER LIGHT WINDOW PRIOR TO WELDING HINGES TO ENCLOSURE.


NOT FOR CONSTRUCTION

				13
				12
				11
				10
				9
				8
				7
2	PLATE, 1/8"x5.0"x19.0", CS			6
1	PLATE, 1/8"x28.0"x29.5", CS, BENT			5
2	FLUORESCENT LIGHTS WITH REFLECTOR, 24"x8"x4" WITH BALLAST	McMASTER CARR	1602K4	4
1	HANDLE W/NUTS	McMASTER CARR	11665A3	3
1	PIANO HINGE, SURFACE MOUNT, 0.120" THICK LEAF, 2" OPENING	McMASTER CARR	15665A99	2
1	LIGHT COVER LID			1
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	ITEM
Bill of Material				

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = .1
.XX = .06
.XXX = .015
ANGLES = 50°-30°

0A	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approved
Revisions			

DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND	US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
---	--

 A Division of URS		US Army Corps of Engineers TOOELE ARMY DEPOT TOOELE, UTAH	
Drawn by: SD NICHOLS		Date: 07/30/08	
Checked by: EG&G Approved:		Scale: NO SCALE	
Engineer: PMCD Mgr. Concur: N/A		Sheet reference number: EG-22-M-8238	
		EG&G Contract No. DACAB7-89-C-0076	
		Rev. 0A	
		Sheet 2 of 2	

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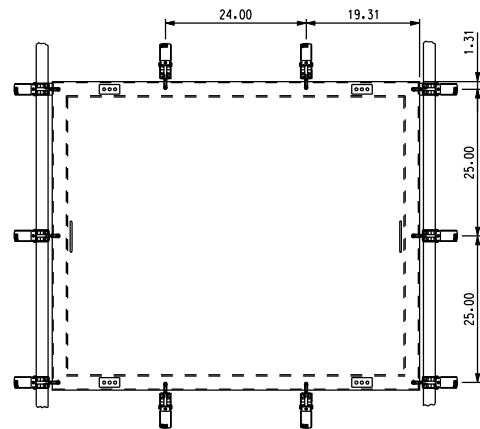
2 UNCONTROLLED COPY - UNLESS STAMPED OTHERWISE BY DCC¹

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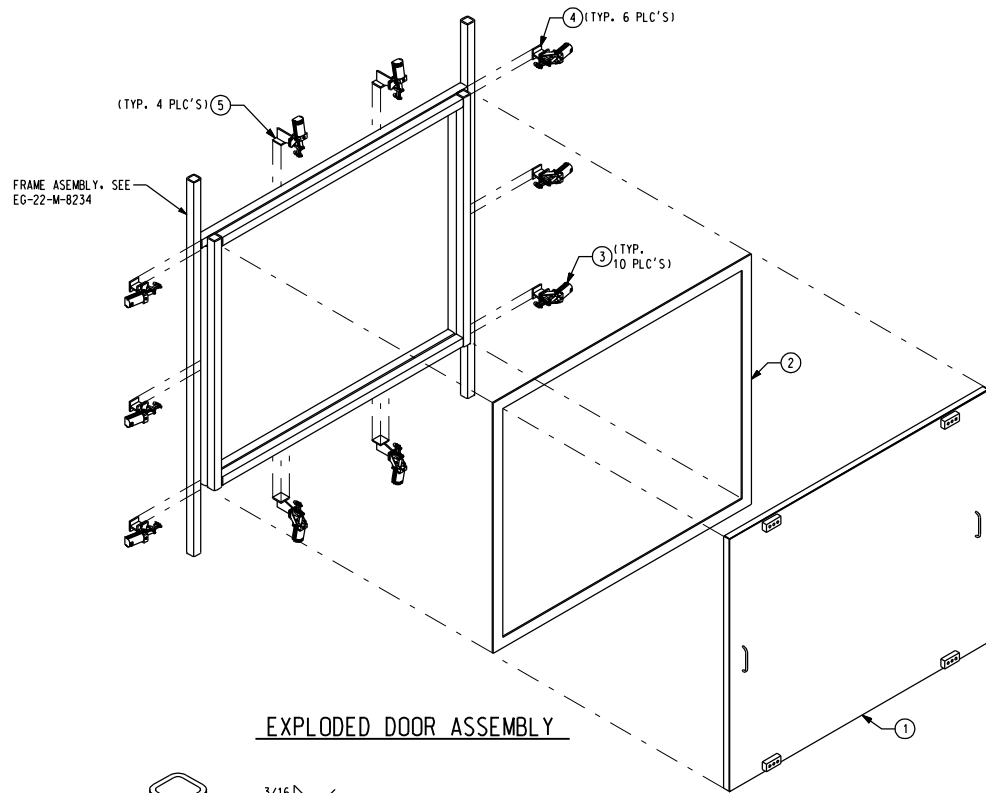
2 UNCONTROLLED COPY - UNLESS STAMPED OTHERWISE BY DCC¹



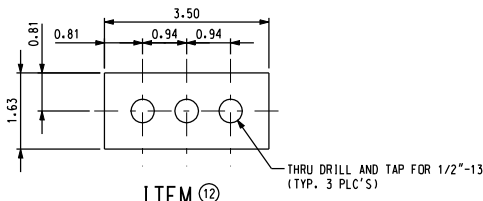
DOOR ASSEMBLY FRONT VIEW



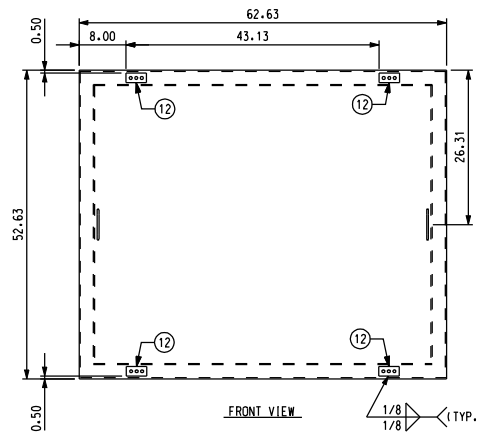
DOOR ASSEMBLY SIDE VIEW



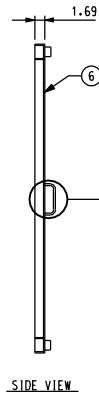
EXPLODED DOOR ASSEMBLY



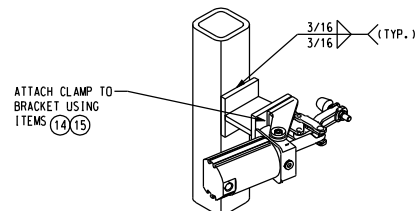
ITEM 12



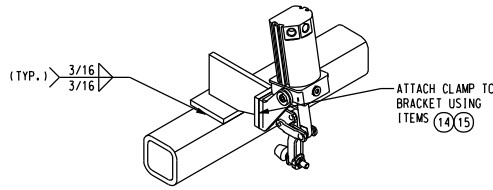
FRONT VIEW



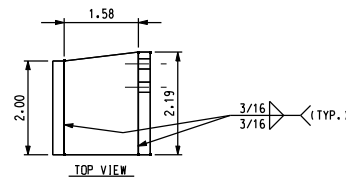
SIDE VIEW



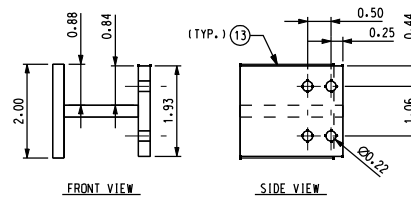
SIDE MOUNTING BRACKET WELDMENT



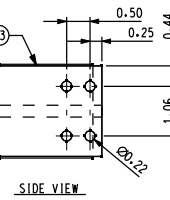
TOP/BOTTOM MOUNTING BRACKET WELDMENT



TOP VIEW



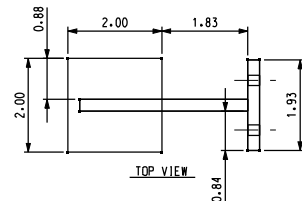
FRONT VIEW



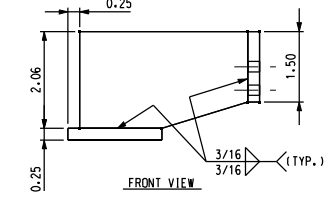
SIDE VIEW

ITEM 4

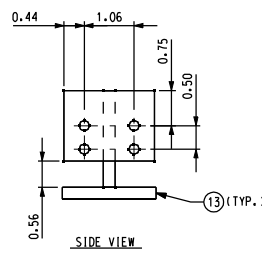
SIDE CLAMP MOUNTING BRACKET



TOP VIEW



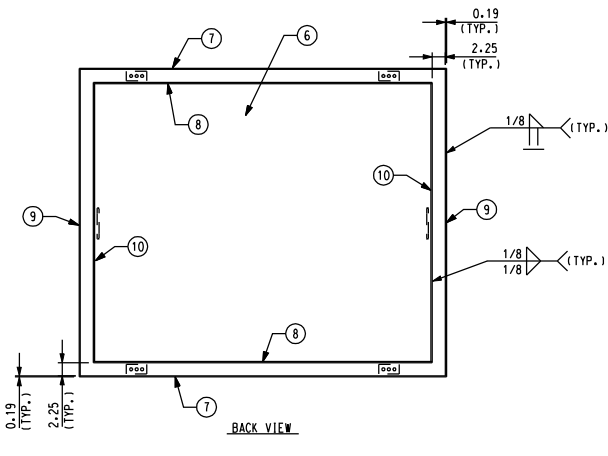
FRONT VIEW



SIDE VIEW

ITEM 5

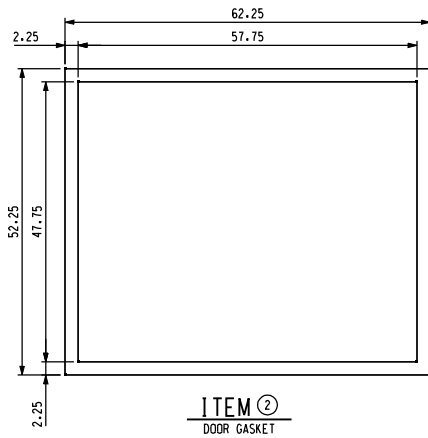
TOP/BOTTOM CLAMP MOUNTING BRACKET



BACK VIEW

ITEM 1

DOOR ASSEMBLY



ITEM 2

DOOR GASKET

DRAWING STATUS									
NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK.	APPROVED	DATE	BY	DATE	BY
0A	06/30/08	ISSUED PER EWO 379603 & ECP 4554	SDN						

NOTES:

1. ALL BEND RELIEFS TO BE MINIMUM.
2. CONDITION PARTS FOR SAFE HANDLING NO CUTTING EDGES PERMISSIBLE.
3. CLEAN AND PREPARE WELD SURFACES TO COMPLY WITH WELD CALLOUTS AND APPLICABLE SPECIFICATIONS.
4. PARTS TO BE CLEAN OF ANY WELD SPATTER.

NOT FOR CONSTRUCTION



40	LOCK NUT, #10-24, CS	McMASTER CARR	90675A011	15
40	MACHINE SCREW, #10-24 x 1", CS	McMASTER CARR	93075A247	14
AS REQ'D	PLATE, 1/4", CS			13
4	PLATE, 1"x1.63"x3.5", CS			12
2	ROD, 5/16" DIA. x 9", CS, BENT			11
2	PLATE, 3/16"x47.38"x1.50", CS			10
2	PLATE, 3/16"x52.25"x1.50", CS			9
2	PLATE, 3/16"x57.75"x1.50", CS			8
2	PLATE, 3/16"x62.63"x1.50", CS			7
1	PLATE, 3/16"x62.63"x52.63", CS			6
4	TOP/BOTTOM CLAMP MOUNTING BRACKET			5
6	SIDE CLAMP MOUNTING BRACKET			4
10	PNEUMATIC CLAMP	DE-STA-CO	802-U	3
1	DOOR GASKET, EPDM, 40 DUROMETER			2
1	DOOR ASSEMBLY			1
QTY	DESCRIPTION	MANUFACTURER	PART NUMBER	ITEM

Bill of Material

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = .1
.XX = .06
.XXX = .015
ANGLES = 50°-30°

0A	ISSUED FOR CONSTRUCTION		
Symbol	Description	Date	Approved
Revisions			

DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND	US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
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ABERDEEN PROVING GROUND, WARELAND		US Army Corps of Engineers		TOOELE ARMY DEPOT	
 EG&G A Division of URS				TOOELE, UTAH	
		CHEMICAL STOCKPILE DISPOSAL PROGRAM			
		OFF SITE			
AREA 10 - SECONDARY WASTE SAMPLING (SWS)					
DVS - DOOR ASSEMBLY					
Drawn by: SD NICHOLAS		Date: 07/30/08			
Checked by:		EG&G Approved:		Scale:	
Engineer:		PMCD Mgr. Concur: N/A		NO SCALE	
				Sheet reference number: EG-22-M-8239	
				EG&G Contract No. DACAB7-89-C-0076	
				Sheet 1 of 1	
				Rev. 0A	

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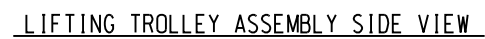
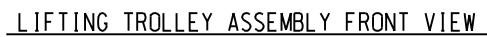
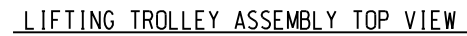
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ABERDEEN PROVING GROUND, MARYLAND				US Army Corps of Engineers		TOOLEE ARMY DEPOT TOOLEE, U.S.	
 EG&G A Division of UNIS		 CHEMICAL STOCKPILE DISPOSAL PROGRAM OFF SITE		AREA 10 - SECONDARY WASTE SAMPLING (SWS) DVS - DOOR TROLLEY ASSEMBLY			
Drawn by: SD NICHOLAS		Date: 07/30/08					
Checked by: EG&G Approved:		Scale: NO SCALE		Sheet reference number: EG-22-M-8240		EG&G Contract No. DAC487-89-C-0070	
Engineer: PMCD Mgr. Concurs: N/A						Sheet 1 of 1	






NOTES:

1. FIELD FABRICATE TROLLEY ONCE DVS ENCLOSURE IS INSTALLED IN THE FIELD.
2. ALL BEND RELIEFS TO BE MINIMUM.
3. CONDITION PARTS FOR SAFE HANDLING NO CUTTING EDGES PERMISSIBLE.
4. CLEAN AND PREPARE WELD SURFACES TO COMPLY WITH WELD CALLOUTS AND APPLICABLE SPECIFICATIONS.
5. PARTS TO BE CLEAN OF ANY WELD SPLATTER.

NOT FOR CONSTRUCTION

Bill of Material

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
BREAK SHARP EDGES - .005/.015
DECIMAL TOLERANCE AFTER FINISH
.X = ±.1
.XX = ±.06
.XXX = ±.015
ANGLES = 10°-30'

 US Army Corps
of Engineers

CHEMICAL STOCKPILE DISPOSAL PROGRAM
OFF SITE
AREA 10 - SECONDARY WASTE SAMPLING (SWS)
DVS - LIFTING TROLLEY ASSEMBLY

Drawn by:	Date:
SD NICHOLS	08/05/08

Checked by:	EG&G Approved:
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Engineer:	PMCD Mgr. Concur:
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Scale:	Sheet reference number:
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NO SCALE EG-22-M-8241

EG&G Contract No.
DACA87-89-6-0036

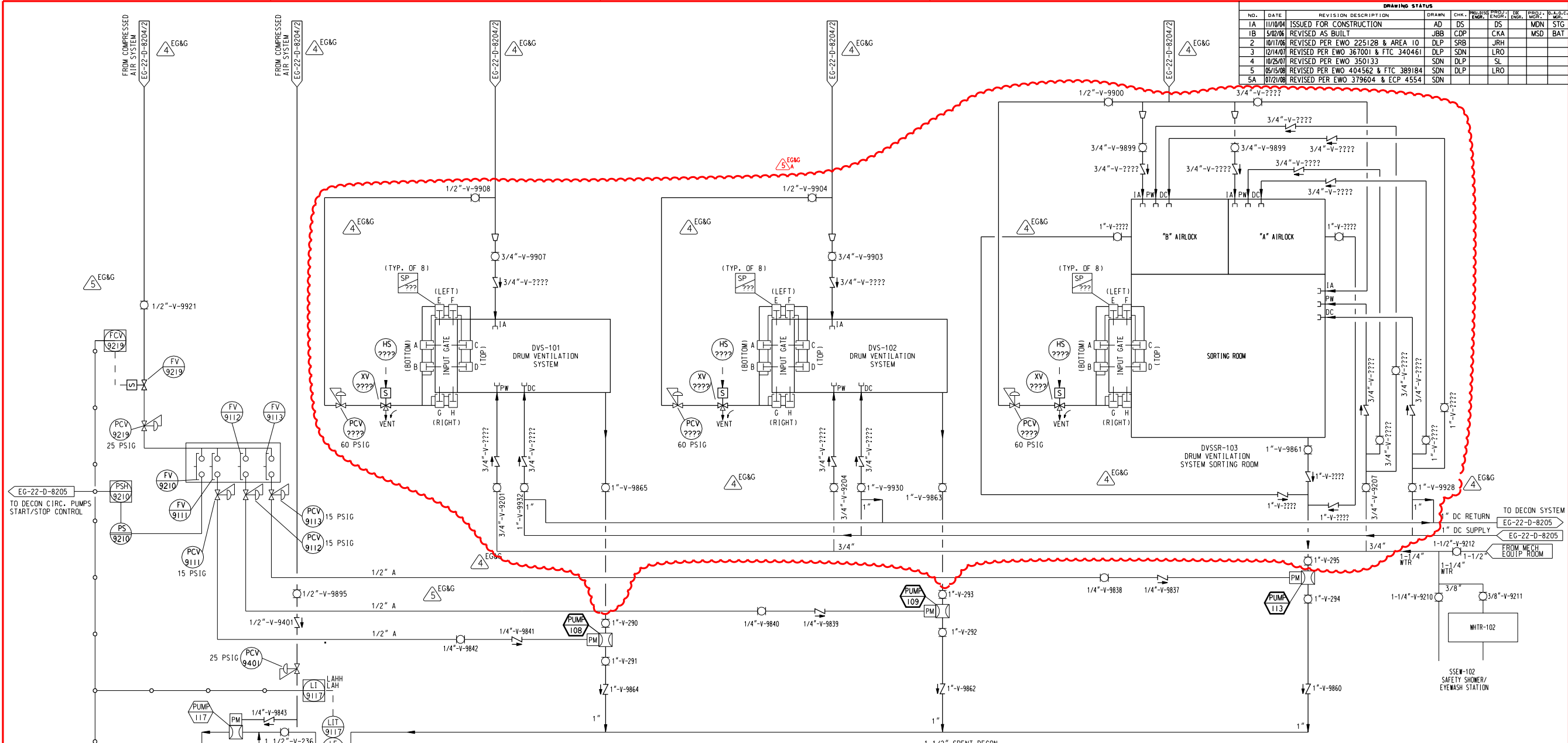
Sheet	Rev.
1 of 1	01

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SOUTH IGLOO - BUILDING 1632

DRAWING STATUS									
NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK.	DESIGNED	ENG.	APP.	PROG.	DATE
1A	11/10/04	ISSUED FOR CONSTRUCTION	AD	DS	CDP	CKA	MSD	MON	STG
1B	5/02/06	REVISED AS BUILT	JBB	CDP	SRB	JRH	MSD	BAT	
2	10/17/06	REVISED PER EWO 225128 & AREA 10	DLP	SRB	DLP	SDN	LRO		
3	12/14/07	REVISED PER EWO 367001 & FTC 340461	DLP	SRB	SDN	DLP	SL		
4	10/25/07	REVISED PER EWO 350133	SDN	DLP	SDN	DLP	SL		
5	05/15/08	REVISED PER EWO 404562 & FTC 389184	SDN	DLP	SDN	DLP	SL		
5A	07/21/08	REVISED PER EWO 379604 & ECP 4554	SDN	DLP	SDN	DLP	SL		

NOTES:
1. ALL INSTRUMENTS, VALVES, AND EQUIPMENT TAG NUMBERS ARE PREFIXED WITH A10-.

SPENT DECON CONTAINER
TOTAL VOLUME = 360 GALLONS
WORKING VOLUME = 250 GALLONS
MATERIAL = POLYETHYLENE

PUMP-116 AND PUMP-117
SPENT DECON SOLUTION PUMPS
RATED = 15 GPM, DP = 15 FEET
MATERIAL = PLASTIC
MOTOR = AIR OPERATED

PUMP-108, PUMP-109, AND PUMP-113
SPENT DECON SOLUTION PUMPS
RATED = 15 GPM, DP = 15 FEET
MATERIAL = PLASTIC
MOTOR = AIR OPERATED

50% DESIGN REVIEW

5A	REVISED FOR CONSTRUCTION			
5	REVISED AS BUILT	05/16/08	LRO	
4	REVISED AS BUILT	01/11/08	SL	
3	REVISED AS BUILT	12/14/07	LRO	
2	REVISED AS BUILT	7/31/07	JRH	
1B	REVISED AS BUILT	5/02/06	MSD	
1A	ISSUED FOR CONSTRUCTION	11/10/04	MON	
Symbol	Description	Date	Approved	
Revisions				
DEPARTMENT OF THE ARMY PROGRAM MANAGER FOR CHEMICAL DEMILITARIZATION ABERDEEN PROVING GROUND, MARYLAND				
US ARMY ENGINEER DISTRICT SACRAMENTO CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA				
EG&G A Division of URS				
US Army Corps of Engineers TOOELE ARMY DEPOT TOOELE, UTAH				
CHEMICAL STOCKPILE DISPOSAL PROGRAM				
AREA 10 - 1632				
P&ID - SHEET #3				
Drawn by: MN/AFD	Date: / /	Scale: NO SCALE	Sheet reference number: EG-22-D-8204	EG&G Contract No. DAC87-89-C-0076 Rev. 1 of 2 5A

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